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CONCESIÓN DE BECAS Y PREMIOS 2024

Fundació Patronat Científic
Col·legi de Metges Illes Balears

Becas *RELYENS-GRUP MED* de rotación externa para MIR, Beca de rotación externa internacional para MIR, Becas de Innovación, Premios de investigación, Premio Camilo José Cela de Humanidades Médicas, Premio *Fundació Mutual Mèdica* al mejor proyecto de tesis doctoral y Certamen Banco Santander de casos clínicos para MIR.

El jurado calificador de los premios y becas convocados por la *Fundació Patronat Científic* del COMIB, reunido el día 7 de noviembre del presente, acordó la concesión de las siguientes becas y premios:

BECAS *RELYENS-GRUP MED* DE ROTACIÓN EXTERNA PARA MIR

Dos becas para estancias en hospitales nacionales, dotadas cada una de 1.500 euros.

- Joan Siquier Padilla, residente de la especialidad de Cardiología en el Hospital Universitario Son Espases, para una estancia de tres meses en el Servicio de Cardiología y Unidad UCI Coronaria e Insuficiencia Cardíaca del Hospital Universitari de Bellvitge en Barcelona.
- Bernat Mas Matas, residente de la especialidad de Dermatología en el Hospital Universitario Son Llàtzer, para una estancia de dos meses en el Servicio de Dermatología Pediátrica del Hospital Sant Joan de Déu en Barcelona.

BECA DE ROTACIÓN EXTERNA INTERNACIONAL PARA MIR

Una beca para la estancia en un hospital internacional, dotada de 3.000 euros.

- Natasha Woods Kreisler, residente de la especialidad de Pediatría y Áreas Específicas en el Hospital Universitario Son Espases, para una estancia de un mes y medio en el Servicio de Gastroenterología, Hepatología y Nutrición Pediátrica del *Hospital for Sick Children (SickKids)* en Toronto, Canadá

BECAS DE INNOVACIÓN

Dos becas para estancias en centros sanitarios extranjeros, dotadas cada una con 3.000 euros.

- Carla Soldevila Verdeguer, FEA de Cirugía General y del Aparato Digestivo en el Hospital Universitario Son Espases, para una estancia de cuatro semanas en la Unidad de Carcinomatosis Peritoneal del *Mount Sinai Hospital* en Toronto, Canadá.
- Olga Claramonte Bellmunt, FEA de Cirugía General y del Aparato Digestivo en el Hospital Universitario Son Llàtzer, para una estancia de tres meses en el Servicio Cirugía Hepato-Biliar en el *Centre Hépato-Biliaire. Hopital Paul Brousse* en Villejuif, Francia.

Desierta la adjudicación de las dos becas para estancias en centros sanitarios nacionales.

PREMIOS DE INVESTIGACIÓN

Tres premios de 1.500 euros.

"Premio Damià Carbó"
Al trabajo científico titulado *"Effects of six months treatment with liraglutide among patients with psoriasis and obesity, beyond metabolic control?"*,
presentado por Joana Nicolau, Antoni Nadal, Pilar Sanchís, Cristina Nadal y Lluís Masmiquel.

"Premio Mateu Orfila"
Desierta la adjudicación.

"Premio Metge Matas"
Al artículo *"The coexistence of low albumin levels and obesity worsens clinical outcomes among subjects admitted for sars-cov-2 infection"*,
cuyos autores son Joana Nicolau, Irene Rodríguez, Andrea Romano, Keyla Dotres, Antelm Pujol y Lluís Masmiquel.

PREMIO CAMILO JOSÉ CELA DE HUMANIDADES MÉDICAS

Un premio dotado de 1.500 euros concedido al trabajo titulado "La compasión me ha hecho ser más persona y mejor médico",
firmado por María Belén González Gragera.

PREMIO FUNDACIÓ MUTUAL MÈDICA AL MEJOR PROYECTO DE TESIS DOCTORAL

Un premio dotado de 2.000 euros al proyecto titulado "Deterioro cognitivo en la diabetes mellitus tipo 2: relación con las características clínicoepidemiológicas y papel de la dieta con especial referencia a la ingesta de fitato", presentado por Antelm Pujol Calafat.

CERTAMEN BANCO SANTANDER DE CASOS CLÍNICOS PARA MIR

Tras la exposición de los cinco casos clínicos seleccionados como finalistas, el jurado, reunido el día 14 de noviembre del presente, acordó conceder:

- **El primer premio, dotado de 1.000 euros,** al caso titulado "Cuando la piel revela el diagnóstico: el rol decisivo del dermatólogo en una paciente con insuficiencia respiratoria grave",
cuya autora es Verónica Fernández Tapia.
- **El segundo premio, dotado de 500 euros,** al caso titulado "Neumonía necrotizante por SAMS ¿productor de PLV? A propósito de un caso",
cuya autora es Noelia Plaza Mendoza.

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ORIGINAL

Prevalence of alcohol consumption among medical university students and its sociodemographic behavioral correlates of drinking

Prevalencia del consumo de alcohol entre los estudiantes universitarios de medicina y sus correlatos sociodemográficos de comportamiento en relación con el consumo de alcohol

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Abstract

Objectives: Alcohol consumption, as a known social problem, is one of the major causes of health and social problems. Alcohol consumption among university students is a global public health concern. Therefore, the purpose of this study is to investigate alcohol consumption and its related factors among students studying at the universities of Tehran, Iran.

Methods: This cross-sectional study was performed on 1420 university students. Behavioral data were collected by self-reporting questionnaires and SPSS software version 22 was used to analyze the data, using descriptive, as well as bivariate and multivariate tests at the significant level of 0.05. All bivariate data with the p value of less than 0.2 were entered into the logistic regression analysis to determine the adjusted odds ratio (aOR) of alcohol consumption.

Results: The results of present study showed that the prevalence of alcohol consumption among the university students during the last 30 days was 14.9% (N = 212, CI: 13.07-16.79). The results of multivariable logistic regression showed a significant difference between those who reported alcohol consumption and those who did not in terms of education level, academic performance and achievement, socioeconomic status, marital status, gender, having high-risk sexual behavior, smoking, and income level.

Conclusion: The results of present study showed that preventive interventions should focus on new university students, smokers, those with poor educational performance, divorced students and those undertaking high-risk sexual behavior. For this purpose, interventions with educational, preventive and motivational approaches are necessary to reduce alcohol consumption among university students.

Key words: Alcohol Consumption, University Student, High-Risk Sexual Behavior, Academic Performance and Achievement.

Resumen

Objetivos: El consumo de alcohol, como problema social conocido, es una de las principales causas de problemas sanitarios y sociales. El consumo de alcohol entre los estudiantes universitarios es un problema de salud pública mundial. Por lo tanto, el propósito de este estudio es investigar el consumo de alcohol y sus factores relacionados entre los estudiantes de las universidades de Teherán, Irán.

Métodos: Este estudio transversal se realizó en 1420 estudiantes universitarios. Los datos conductuales se recogieron mediante cuestionarios de autoinforme y se utilizó el programa SPSS versión 22 para analizar los datos, mediante pruebas descriptivas, así como bivariables y multivariables al nivel de significación de 0,05. Todos los datos bivariables con el nivel de significación de 0,05 se analizaron mediante el programa SPSS. Todos los datos bivariados con un valor p inferior a 0,2 se introdujeron en el análisis de regresión logística para determinar la odds ratio ajustada (aOR) del consumo de alcohol.

Resultados: Los resultados del presente estudio mostraron que la prevalencia del consumo de alcohol entre los estudiantes universitarios durante los últimos 30 días fue del 14,9% (N = 212, IC: 13,07-16,79). Los resultados de la regresión logística multivariable mostraron una diferencia significativa entre los que declararon consumo de alcohol y los que no en términos de nivel educativo, rendimiento y logros académicos, estatus socioeconómico, estado civil, sexo, tener conductas sexuales de alto riesgo, fumar y nivel de ingresos.

Conclusiones: Los resultados del presente estudio mostraron que las intervenciones preventivas deberían centrarse en los nuevos estudiantes universitarios, los fumadores, aquellos con bajo rendimiento académico, los estudiantes divorciados y los que adoptan conductas sexuales de alto riesgo. Para ello, son necesarias intervenciones con enfoques educativos, preventivos y motivacionales para reducir el consumo de alcohol entre los estudiantes universitarios.

Palabras clave: Consumo de alcohol, estudiante universitario, conducta sexual de alto riesgo, rendimiento y desempeño académico.

Introduction

Alcohol consumption is one of the major causes of health and social problems. Alcohol consumption among university students is a significant public health concern worldwide[1]. In this regard, estimates made all over the world show 2.84 million alcohol-related deaths in 2017[2]. Also in 2016, alcohol consumption was the seventh risk factor for death and lost years of life due to disability[3]. A study in the United States showed that 23% of students' drink alcohol frequently[4]. The prevalence of alcohol consumption among undergraduate students has been reported at 40.6% in Nigeria[5] and 41% in Slovakia[6]. Another study has shown that many of students consume alcohol more than recommended amount[7]. A study in Brazil also showed that the prevalence of binge drinking is 18.3% in men and 6.1% in women[8]. These studies highlight the vulnerability of university students towards alcohol consumption.

The university or college life is associated with many changes, including separation from parents, being away from home, lack of parental supervision, high level of stress due to workload and pressure to succeed, and increased social interactions with peers, all of which make students prone to alcohol consumption[9,10]. Alcohol consumption has many short and long-term consequences for university students, including poor academic performance and reduced skill acquisition, and it leads to violence, physical and sexual abuse, hospitalization due to alcohol consumption, mental and sexual harm, increased high-risk sexual behavior, accidents and even death[11-14]. Alcohol consumption in adolescence can also lead to alcohol dependence in adulthood[15].

Alcohol and substance use is the first problem of university life[16]. The mean age of people entering university in Iran has decreased in recent years and almost half of all young people in Iran enter university each year. Alcohol consumption is illegal in Iran, but people can have access to alcohol through dealers who smuggle alcohol from foreign countries[13]. Therefore, investigating the prevalence and changing trend of alcohol consumption as well as its side effects is a vital factor in planning and formulating policies and preventive measures, thus the purpose of present study is to investigate alcohol consumption and its related factors among students studying at the universities of Tehran, Iran.

Methods

Study design and sampling
This population-based cross-sectional study was conducted between January and October 2021 in Tehran, Iran on 1420 university students to investigate the prevalence of alcohol consumption among them. Multistage and stratified sampling was used to select the study setting and sample. To prevent selective bias during sampling, all universities in Tehran were considered as the first strata, and then the number of faculties and classes in each university were considered as the second and third stratums. Finally, based on their proportion, random sampling was performed (stratified sampling). In randomly selected classes, students were asked to participate in the study if they wish to do so, after providing written informed consent.

Data collection tools
Alcohol consumption during the last 30 days was defined as consuming at least one alcohol drink (ie; drinking a bottle of beer, a glass of wine, a glass of liquor such as whiskey, rum, cocktail or mixed drink) in the 30 days. The responses to question;" have you had any alcoholic drink in the last 30 days?" were recorded as "no (0)" and "yes (1)" on a dichotomous scale. We also investigated the relationship between current alcohol consumption and independent variables of interest, including age, gender, education level, marital status, residential status, socioeconomic status, history of alcohol consumption, father's alcohol consumption, mother's alcohol consumption, smoking, income level, academic performance and achievement, and high-risk sexual behaviors (sexual intercourse without condom).

Statistical analysis
We found that the prevalence of alcohol consumption in the last 30 days was 14.9% among the students, with a 95% Confidence Interval (CI). We also examined the relationship between other variables and study outcomes using Chi-square or Fisher's exact tests. The variables with a p-value of less than 0.2 were included in the multivariate logistic regression model. Also based on the literature, we included confounding variables in the model, even if their p-value was greater than 0.2. The adjusted odds ratio (AOR), the point estimate and 95% confidence interval (CI) were reported as the effective measures. We used SPSS-22 software for data analysis, and a p-value of less than 0.05 was considered statistically significant.

Ethical considerations
Ethics approval for this study was obtained from the Research Ethics Committee of social welfare and rehabilitation science, Tehran, Iran (IR.USWR.REC.1399.175).

Results

Sample characteristics
A total of 1420 students were recruited from universities in Tehran, Iran. The mean (SD) age of the participants was 24.24 (4.26) years. Most of the participants (65.21%) were male, and had an undergraduate degree (62.71%), (Table I). Results showed that the prevalence of alcohol consumption in university students was 14.9% (N = 212, CI: 13.07-16.79). In bivariate analysis, the alcohol consumption in university students was significantly correlated with the age, education level, marital status, socioeconomic status, father's alcohol consumption,

mother's alcohol consumption, smoking, income level and having high-risk sexual behaviors (P<0.05). Also, residential status and gender were not statistically correlated with the prevalence of lifetime substance use in university students (P>0.05), (**Table I**).

In the multivariable logistic regression model, the results showed a significant difference between those who reported alcohol consumption and those who did not in terms of education level (Doctoral and post-doctoral degree vs bachelor's degree, OR =.036 CI:.253 -.955), academic performance (low vs high academic performance OR = 3.71 CI: 1.31-10.48), socioeconomic status (high vs low, OR = 2.26 CI: 1.32-3.86, and moderate vs low OR=6.75 CI: 3.05-14.94), marital status (married vs single OR=2.11 CI: 1.02-4.36), gender (male vs female OR = 1.78 CI: CI: 1.17-2.71), having high-risk sexual behavior (yes vs no OR = 2.34 CI: CI : 1.49-3.66), smoking (yes vs no OR = 6.74 CI: CI: 10.65-427), and income level (<3 vs >3 OR = 3.22 CI: CI: 1.89-5.49), (**Table II**).

Table I: Descriptive characteristics and bivariate analysis of variables associated with current alcohol consumption among university students.

Characteristic		Current state of alcohol consumption		p-value
		No Frequency (%)	**Yes** Frequency (%)	
Age	<22 22-24 >24	380 (90) 356 (83.6) 472 (82.5)	42 (10) 70 (16.4) 100 (17.5)	0.002
Gender	Male Female	790 (85.3) 418 (84.6)	136 (14.7) 76 (15.4)	0.7
Marital status	Single Married Widows	758 (95.2) 390 (71.2) 60 (78.9)	38 (4.8) 158 (28.8) 16 (21.1)	0.001
Residential status	Living with families (parents) Students' dormitory Rented accommodation	238(20) 782 (65.7) 170 (14.3)	78 (36.8) 74 (34.9) 60 (28.3)	0.11
Socioeconomic status	Low Moderate High	146 (89) 688 (80.6) 342 (93.4)	18 (11) 166 (19.4) 24 (6.6)	0.001
Father's alcohol consumption	Yes No	26 (56.5) 1180 (86)	20 (43.5) 192 (14.)	0.001
Mother's alcohol consumption	Yes No	960 (85.9) 234 (81.3)	158 (14.1) 54 (18.8)	0.05
Education level	Bachelor's degree Master's degree Doctoral and post-doctoral degree	740 (84.3) 276 (90.8) 174 (80.6)	138 (15.7) 28 (9.2) 42 (19.4)	0.002
Academic performance and achievement	High Median Low	778 (87.6) 326 (77.3) 82 (93.2)	110 (12.4) 96 (22.7) 6 (6.8)	0.001
Having high-risk sexual behavior	No Yes	1086 (90.5) 122 (55.5)	114 (9.5) 98 (44.5)	0.001
Smoking	No Yes	980 (94) 228 (60.3)	62 (6) 150 (39.7)	0.001
Income level (million Tomans)	<3 millions >3 millions	436 (94) 724 (79.7)	28 (6) 184 (20.3)	0.001

Table II: The result of multivariate logistic regression model for determining factors related to the current state of alcohol consumption in university student.

		B	S.E.	Wald	df	Sig.	AOR	95% C.I	
								Lower	Upper
Education level	Undergraduate Master's degree Doctoral and post-doctoral degree	ref 0.065 -0.709	0.274 0.339	0.056 4.390	1 1	0.813 0.036	1.067 0.492	0.623 0.253	1.828 0.955
Academic Performance (achievement)	High Median Low	ref 0.440 1.312	0.532 0.530	0.684 6.132	1 1	0.408 0.013	1.553 3.712	0.547 1.315	4.405 10.481
Socioeconomic status	Low Moderate High	ref 1.910 0.816	0.405 0.274	22.226 8.885	1 1	0.000 0.003	6.756 2.261	3.053 1.322	14.948 3.867
Marital status	Single Married Widows	ref -0.283 0.749	0.431 0.369	0.431 4.105	1 1	0.512 0.043	0.754 2.114	0.324 1.025	1.754 4.361
Gender male vs female		0.581	0.214	7.391	1	0.007	1.788	1.176	2.719
Having high-risk sexual behavior yes vs no		0.851	0.229	13.848	1	0.000	2.342	1.496	3.666
Smoking yes vs no		1.909	0.233	67.056	1	0.000	6.747	4.272	10.655
Income level <3 vs >3 million Tomans as Iranian currency		1.172	0.271	18.703	1	0.000	3.229	1.898	5.492

Discussion

The prevalence of alcohol consumption within the last 30 days was 14.9% among university students in the present study, which is in line with the results of previous studies conducted in Iran that also reported the prevalence of alcohol consumption at 10-15.82%[17,18]. Other studies in different parts of the world reported the prevalence of alcohol consumption among students at 20.3%[19], 23%[4], 40.6%[5], 41%[6] and even 80%[14], which are more than what we found in the present study. The reason for this difference, as mentioned before, can be the Islamic law of Iran, which makes it illegal to buy or drink alcohol. Therefore, it is possible that the prevalence of alcohol consumption in this study is underreported due to social limitation and fear of legal action.

The results of present study showed that higher levels of education were associated with lower level of alcohol consumption among university students. The reason for this reduction in alcohol consumption can be increased knowledge of alcohol consumption-related harms in higher educated students. This finding may help to develop targeted academic interventions to reduce alcohol consumption in the future. In line with this finding, various studies in Nigeria[5] and England[20] have shown that alcohol consumption in undergraduate students is higher than postgraduate students. In this regard, a study in Slovakia showed that binge drinking among university students decreases with increasing academic years[6]. The findings of present study showed that students with lower education level consume more alcohol than students with higher education level. Most of the studies have shown that alcohol consumption is higher in high school students with low academic performance[20,21]. In order to determine whether alcohol consumption has caused the students to have low academic performance or vice versa, this hypothesis needs to be confirmed in longitudinal studies.

Students with better socioeconomic status and higher income level reported more alcohol consumption in this study, which is consistent with the results of other studies that show higher socioeconomic status is associated with higher alcohol consumption[5,19,22]. Contrary to the findings of present study, several studies have shown that low income level is associated with more alcohol consumption[20]. Perhaps this discrepancy can be justified by the fact that alcohol consumption in Iran is illegal and it has to be smuggled into the country which makes it more expensive. Alcoholic drinks are also not available to everyone, and for this reason, people with high income level can buy and consume alcohol more easily. However, in European countries, high prevalence of alcohol consumption among low-income people can be due to the fact that alcohol can help these people to escape from bitter realities such as low income and low educational status, or even alcohol dependence.

The results of this study showed that singles and married people consume less alcohol than divorced people. In line with this finding, other studies have shown that married students consume less alcohol than others[23,24].

In line with the expectations, the results of this study indicated that men consume more alcohol than women, because socially, men in Iran have easier access to alcohol. This finding is similar to other studies that have shown alcohol consumption is higher in men than in women[9,19,20,23,25,26]. It should be noted that some studies have shown binge drinking has increased among women[27], or it is at the same level as in men[28]. A study in the Netherlands also showed no difference in alcohol consumption between men and women[29]. These contradictory findings require longitudinal and cohort studies to investigate alcohol consumption among men and women.

The results of this study also showed that high-risk sexual behavior is associated with increased alcohol consumption. Previous studies have confirmed that alcohol consumption leads people to adventurous sexual behaviors and increases the likelihood of unsafe sex[30,31].

The findings of present study revealed that students who use tobacco have a higher chance of alcohol consumption than non-smokers. In line with this finding, other studies have also shown that people, who smoke tobacco[19,32] and use drugs, consume more alcohol than others[9,23].

This cross-sectional study had some limitations. For instance, causal conclusions cannot be drawn from the findings of present study. In this study, anonymity was guaranteed, but since the data was collected through self-reporting, it might have been biased. The low response rate of participants could also reflect the social stigma of alcohol consumption, especially among women. Therefore, caution should be taken in generalizing these results.

Conclusion

The results of present study showed that preventive interventions should focus on new university students, smokers, those with poor academic performance, divorced people and those with high-risk sexual behavior. For this purpose, interventions with educational, preventive and motivational approaches are necessary to reduce alcohol consumption among university students.

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ORIGINAL

Varicocele Findings in Children: Retrospective Research and Literature Review

Hallazgos de varicocele en niños: Investigación retrospectiva y revisión de la literatura

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Abstract

Objectives: Varicocele patients also visit Paediatric Surgery outpatient clinics less frequently than adult urology clinics. This study aimed to investigate the clinical and treatment processes of children evaluated for varicocele in our clinic and assess whether any differences exist compared to the literature.

Methods: Patients diagnosed with varicocele who visited the outpatient clinic between January 2018 and December 2023 were reviewed. Data collected included patient age, complaints, onset time, additional symptoms, presence of varicocele on the Valsalva maneuver, treatments performed, and other findings.

Results: Of 12,011 total patients who visited our clinic, 8,095 were male. Among these, 12 (0.15%) had varicocele complaints, with an average age of 14.2 years. The most common reasons for admission were pain, scrotal swelling, vascular dilation, and referral after ultrasonography from another center. The time from onset of complaints to clinic visit ranged from two days to three years, but the exact onset time was unclear in 5 patients. Right varicocele, which is rare, was detected in two patients. Four patients had stage 1, four had stage 2, and three had stage 3 varicocele; one patient was not staged. Seven patients tested positive with the Valsalva maneuver, and three underwent surgery.

Conclusion: this study highlights the predominance of varicocele cases in preadolescent and adolescent patients, aligning with existing literature. The unexpected occurrence of right-sided varicocele in three cases warrants further investigation.

Key words: varicocele, child, adolescent varicocele, varicocelectomy.

Resumen

Objetivos: Los pacientes con varicocele acuden con menor frecuencia a las consultas externas de Cirugía Pediátrica que a las de urología de adultos. Este estudio tiene como objetivo investigar los procesos clínicos y de tratamiento de los niños evaluados por varicocele en nuestra clínica y evaluar si existen diferencias en comparación con la literatura.

Métodos: Se revisaron los pacientes diagnosticados de varicocele que acudieron a la consulta externa entre enero de 2018 y diciembre de 2023. Los datos recogidos incluyeron edad del paciente, quejas, tiempo de aparición, síntomas adicionales, presencia de varicocele en la maniobra de Valsalva, tratamientos realizados y otros hallazgos.

Resultados: De un total de 12.011 pacientes que acudieron a nuestra consulta, 8.095 eran varones. De ellos, 12 (0,15%) presentaban molestias por varicocele, con una edad media de 14,2 años. Los motivos de ingreso más frecuentes fueron dolor, inflamación escrotal, dilatación vascular y derivación tras ecografía desde otro centro. El tiempo transcurrido desde el inicio de las molestias hasta la visita clínica osciló entre dos días y tres años, pero en 5 pacientes no estaba claro el momento exacto del inicio. El varicocele derecho, poco frecuente, se detectó en dos pacientes. Cuatro pacientes presentaban un varicocele en estadio 1, cuatro en estadio 2 y tres en estadio 3; un paciente no fue clasificado. Siete pacientes dieron positivo en la maniobra de Valsalva, y tres fueron intervenidos quirúrgicamente.

Conclusión: este estudio destaca el predominio de casos de varicocele en pacientes preadolescentes y adolescentes, en consonancia con la literatura existente. La ocurrencia inesperada de varicocele derecho en tres casos justifica investigación adicional.

Palabras clave: varicocele, niño, varicocele adolescente, varicocelectomía.

Introduction

Varicocele is a clinical condition characterized by the expansion of the pampiniform plexuses[1,2]. It is encountered in 10-15% of men[1,3]. There are no screening programs worldwide for paediatric patients to follow up with varicocele[4].

The most apparent reason for the need to pay attention to the issue is the risk of developing testicular atrophy over time due to the increasing effect of heat in children[1,3]. The temperature of the testicles is 2 degrees lower than the body's average temperature[5]. However, diseases such as varicocele may cause degenerative problems in the testicle by causing this temperature to increase[5]. However, some studies state that it is unclear exactly how dilated pampiniform veins and spermatic vein plexuses affect[6]. It is also said that increasing hydrostatic pressure may be effective in testicular degeneration[5].

Some publications state that sclerosing treatment is preferred, especially in adults, and has a high success rate. Although it is known that the surgical method is less likely to cause complications than sclerosing treatment, opinions regarding this treatment method in children are not so explicit[7]. For surgical indication in children, the reasons are shown as a 15-20% volume difference between the testicles, pain or other additional complaints, and the stage of the varicocele[1,2]. There are also questions regarding the choice of surgery and surgical methods in varicocele treatment[1,3].

In a meta-analysis on varicocele development in children, it is seen that literature information is collected under five headings: First, it occurs developmentally in 20-30% of adolescents, second, articles in the literature about varicocele in children generally examine complications that develop after surgical procedures, third, the characteristics of the paediatric age group are rarely mentioned , fourth, there is no long-term follow-up and finally, in those with long-term follow-up, only semen analysis is emphasized[4,8].

However, due to individual differences, there may be many variations in the clinical process of varicocele, and therefore, it may not be followed clearly[1,3,5,6]. In addition, the fact that the literature contains controversial points at every stage of varicocele indirectly indicates the need to continue examining the issue.

Due to all this information, in line with the data we have, a study was planned to determine the age ranges of paediatric patients and reveal what was done in the process without aiming to investigate etiology through semen analysis. Thus, it was aimed to contribute to the literature.

Methods

After receiving the approval form numbered 2024-GOKAEK-247_2024.07.17_100 from the XXXX University Non-Interventional Clinical Research Ethics Committee, the files of the patients who applied to the paediatric surgery outpatient clinic between January 2018 and December 2023 were retrospectively scanned and those diagnosed with varicocele were evaluated. The ages of the patients, their complaints, the onset time of their complaints, whether they had additional complaints, the stage of the varicocele using the Valsalva maneuver in the physical examination, the patient's laboratory and radiology examinations, and the treatment methods used were recorded. Descriptive statistics were performed on all data. The results were examined together with the literature.

Results

Of the total 12,011 patients who applied to the paediatric surgery outpatient clinic between January 2018 and December 2023, 8,095 were male, and 12 (0.15%) had varicocele complaints. It was observed that 3 of the patients were operated on, two patients did not come to the surgery appointment, six patients were followed up, and one of them did not come for regular check-ups. It was determined that one of the patients came to our clinic with the same complaint after being operated on by a urologist, and another patient also applied to the urology clinic in the same hospital after being examined by a paediatric surgeon. Although one patient had varicocele-like complaints, it was observed that varicocele could not be detected in his examination and ultrasonography. The patients' characteristics and the examinations' distribution are given in **table I**. All patients who underwent surgery received a subinguinal open approach. None of the patients were treated with a laparoscopic approach or the use of indocyanine green. Additionally, none of the patients developed hydrocele as a postoperative complication.

Discussion

Children may encounter varicocele problems at approximately 15%[3]. It has been reported that 28% of subclinical lesions in children progress to the disease level[6]. The rate of patients reported to our clinic can be expressed as 0.15%. In this respect, a significant proportional difference is observed. It was thought that this situation could be interpreted as a subclinical patient group not being detected during examinations, admissions to other hospitals, or ultrasound not being used routinely. It was thought that the reasons why the rate was so low compared to the literature could be investigated.

Varicocele can be a cause for concern for parents of paediatric patients, especially since there is a possibility of infertility[3]. The adverse effects of varicocele on the testicle are thought to be poor semen quality, sperm dysfunction, testicular histology disorder, and sex hormone problems[3]. Varicocelectomy procedures are also performed in children to prevent the emergence of these problems[2]. Since the possibility of measuring semen quantity and quality in children is low, the generally accepted practice is to plan treatment by considering testicular hypotrophy[2]. In our clinical practice, when a varicocele is detected, the decision is made based on the staging of the clinical appearance of the varicocele rather than the possibility of testicular atrophy.

It is known that most cases are left hemiscrotal, but right hemiscrotal cases are also rarely encountered, and these are generally a reflection of diseases that cause intra-abdominal problems. A study in the literature states that varicocele originating from the right side regresses and disappears[6]. The most interesting result of our study was that two out of twelve patients had right varicoceles. These patients did not have accompanying abdominal pathology. In addition, during the follow-up, it was observed that the varicocele did not progress, as stated in the literature.

The most commonly used test for the diagnosis of varicocele is colour Doppler USG. Although there are debates about its use, it is routinely requested in Europe when varicocele is clinically suspected and is not routinely used in the USA and Asia[5]. In our clinic, colour Doppler USG was used to diagnose all but two patients. It was understood that the two patients for whom USG was not requested were not needed because they had stage 3 varicocele. Therefore, it can be said that Doppler USG is used routinely in our clinic. Apart from the frequency of use of colour Doppler USG, another controversial issue is whether expressing venous diameters will be sufficient to diagnose varicocele. The generally accepted situation is that a measurement over 3 mm will be enough for diagnosis. The average

measurements are 2.62 mm in the spermatic cord and 2.33 mm in the peritesticular veins[5]. As **table I** shows, our ultrasonography practices in diagnosis and follow-up were in accordance with the standards.

One of the topics of discussion when diagnosing varicocele is the Valsalva maneuver. It is stated that the Valsalva maneuver has a sensitivity and specificity of 84%. Still, there is debate about whether the Valsalva maneuver should be performed while standing or lying down or under what other conditions it should be performed[5]. In our study, it was Valsalva negative in five patients, but no information could be found in the archive records about whether it was performed standing or lying down. Additionally, it was determined that 3 of the seven patients who were found to be Valsalva positive underwent surgery.

Doppler USG can also be used after varicocelectomy, but it may not be effective in expressing the success of the treatment since venous fullness will continue for a while[5]. Postoperative Doppler ultrasound is not used in our clinic.

The first thing that comes to mind in treatment practices is varicocelectomy, but treatment methods vary. Meta-analyses revealed that surgical ligation and sclerosing embolization did not differ significantly in complications and success[3]. Commonly used methods in surgery are Ivanissevich (ligation of the internal spermatic vein from the inner ring) or Palomo (ligation of the vein from the anterior iliac level) methods[2]. Vascular ligations can also be performed laparoscopically. There are various opinions regarding the ligation level of the testicular vein in laparoscopic varicocelectomies[9]. There are various opinions about whether testicular artery ligation should be performed[10]. It is stated that whether the artery is ligated or not, in 63% to 89% of cases, the testicle catches up with its growth rate compared to the other testicle within 12-24 months after the surgery[9]. The Ivanissevich method was preferred in varicocelectomies performed in our clinic.

Table I: Characteristics and examination distributions of varicocele patients.

Case	Age	Symptom	Side	Symptom duration	Comorbidity	Grade	Valsalva	USG	Treatment
1	16	Dilation of the vein	Right	Uncertain	None	1	(-)	3 mm	follow-up
2	15	Testicular enlargement	Left	2 years	Hydrocele	0	(-)	None	Normal
3	16	Pain in the groin	Right	2 years	Right inguinal hernia	1	(-)	Normal	follow-up
4	14	Pain in the groin	Left	6 days	Lymphadenitis	1	(+)	2.2 mm	follow-up
5	15	Pain and swelling	Bilateral	3 years	None	2	(+)	Left:4.1 mm Right:4.7 mm	Operated (another clinic)
6	12	Scrotal Swelling	Left	1 year	None	3	(+)	3 mm	Lost from follow-up
7	14	Pain and swelling	Left	Uncertain	Inguinal hernia	2	(+)	Normal	follow-up
8	14	Admitted after USG finding	Left	Uncertain	Right spermatic cord cyst	1	(-)	3.4 mm	follow-up
9	11	Scrotal Swelling	Left	3 months	None	3	(-)	(-).	Rejected operation
10	12	Scrotal Swelling	Left	3 months	None	2	(+)	2.3 mm	Operated, remission
11	13	Swelling in the groin	Left	2 days	None	3	(+)	(-)	Operated, remission
12	16	Pain in the groin	Left	Uncertain	None	2	(+)	2.1 mm	Lost from follow-up

Various complications may occur in varicocele treatments. It is stated that recurrence rates vary between 2.1% and 7.6%[1]. The reason for the recurrence of varicocele is that testicular vein collaterals don't close completely[9]. It is stated that the recurrence rate is higher in patients whose arteries are preserved. If artery ligation is to be performed, it is recommended to protect the lymphatic system to prevent hydrocele formation[10]. It is reported that the possibility of hydrocele after surgery may be between 0.8% and 11.4%[1]. In some studies, the probability of hydrocele formation varies between 3% and 29%. Impairment of lymphatic drainage is shown as the reason[9]. The most common complications in laparoscopic varicocelectomies are hydrocele, recurrence, and slowing of the growth rate of the testicle compared to the other testicle[9]. Information regarding the improvement of testicular functions in adults after varicocelectomy is also controversial, and there is no clear evidence of this[5]. No complications were encountered in the patients we operated on.

The results of clinical studies and meta-analyses do not constitute high-quality evidence for varicose treatments. One factor that may contribute to this is the existence of retrospective clinical studies, such as our study[1].

This study has several limitations. First, the retrospective design limits the ability to control for potential confounding variables. Second, the small sample size of patients with varicocele may reduce the generalizability of the findings. Third, the lack of long-term follow-up data, particularly regarding testicular function and fertility outcomes, limits our understanding of the full clinical implications. Lastly, inconsistent follow-up from patients, potentially due to non-compliance, impacts the ability to assess treatment outcomes comprehensively.

Conclusion

This study highlights the predominance of varicocele cases in preadolescent and adolescent patients, aligning with existing literature. The unexpected occurrence of right-sided varicocele in three cases warrants further investigation.

Conflicts of interest

Authors have no conflicts of interest to disclose.

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ORIGINAL

Alternative health insurance model in economically developed countries

Modelo alternativo de seguro de enfermedad en los países económicamente desarrollados

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Abstract

The article explores the potential and dynamics of the non-profit health insurance model, emphasizing its organizational and legal structures, range of services, and factors influencing efficiency and competitiveness. It utilizes various methods, including structural, economic, and statistical analyses, to assess the viability of implementing non-profit insurance within Ukraine's healthcare system, drawing comparisons with practices in Western Europe, the United States, and Japan. Non-profit insurance companies, owned by their clients rather than investors, play a significant global role, accounting for about one-third of annual premiums and serving over 900 million policyholders. These entities blend features of financial and non-profit organizations: they manage statutory and insurance funds for financial operations while prioritizing member benefits over profit. Their unique approach allows for cost-effective premiums, tailored insurance conditions, democratic self-governance, and enhanced accessibility to a broad population. The study highlights the global relevance of non-profit insurance as a counterbalance to commercial insurers, fostering competition and mitigating unjustified price increases. It underscores the potential benefits for Ukraine in adopting this model, leveraging lessons from international practices, while considering national economic and social contexts. Collaborative integration of state, joint-stock, and non-profit insurers is proposed as an optimal solution to meet societal insurance needs. Further research is recommended to design a balanced health insurance mechanism incorporating diverse insurance models.

Key words: Medical insurance, insurance companies, market of medical services, insurance coverage model.

Resumen

El artículo explora el potencial y las dinámicas del modelo de seguro médico sin fines de lucro, enfatizando sus estructuras organizativas y legales, la gama de servicios ofrecidos y los factores que influyen en su eficiencia y competitividad. Utiliza diversos métodos, incluidos análisis estructurales, económicos y estadísticos, para evaluar la viabilidad de implementar seguros sin fines de lucro en el sistema de salud de Ucrania, comparándolo con prácticas de Europa Occidental, Estados Unidos y Japón. Las compañías de seguros sin fines de lucro, propiedad de sus clientes en lugar de inversores, desempeñan un papel global significativo, representando aproximadamente un tercio de las primas anuales y sirviendo a más de 900 millones de asegurados. Estas entidades combinan características de organizaciones financieras y sin fines de lucro: gestionan fondos estatutarios y de seguros para operaciones financieras, mientras priorizan los beneficios de los miembros sobre las ganancias. Su enfoque único permite primas rentables, condiciones de seguro adaptadas, autogobierno democrático y mayor accesibilidad para una amplia población. El estudio destaca la relevancia global de los seguros sin fines de lucro como contrapeso a los aseguradores comerciales, fomentando la competencia y mitigando aumentos de precios injustificados. Subraya los posibles beneficios para Ucrania al adoptar este modelo, aprovechando lecciones de prácticas internacionales, mientras considera los contextos económicos y sociales nacionales. Se propone la integración colaborativa de aseguradoras estatales, de capital y sin fines de lucro como una solución óptima para satisfacer las necesidades de seguros de la sociedad. Se recomienda continuar la investigación para diseñar un mecanismo equilibrado de seguro médico que incorpore diversos modelos de seguro.

Palabras clave: Seguro médico, compañías de seguros, mercado de servicios médicos, modelo de cobertura de seguros.

Introduction

The COVID-19 pandemic revealed weak links in the medical systems of different countries and drew the attention of global public to the issues in the field of health care. The crisis of the national health care system in Ukraine, especially in terms of ensuring the availability and quality of medical services, is caused by the lack of an effective mechanism for its financing. According to experts, an effective tool for optimizing medical expenses of the state budget and providing citizens of Ukraine with established social guarantees is the implementation of medical insurance[1].

Medical insurance is defined as a system of socio-economic relations to protect the interests of the population from the risk of costs associated with receiving medical care. Its economic basis is an insurance fund, which pays for medical services and finances preventive measures. This allows transferring part of the financial burden from the country's budget to insurance companies and increasing the availability of medical services. In most countries, health insurance functions on the basis of a combination of mandatory insurance (guaranteed by the state) and voluntary (provided by insurance companies)[2].

However, the question of its implementation in Ukraine caused heated discussions in society. Most insurance companies have a low level of public trust due to high tariffs (the minimum cost of an insurance policy starts at 7000 UAH), lack of a common standard of the basic set of medical services and the general unattractiveness of insurance conditions. On the other hand, the lack of interest of these companies in serving clients with high insurance risks and insufficient solvency not only limits the access of a wide range of citizens to insurance services, but also causes public rejection of medical reform in general[3].

The uncertainty of the transition mechanism of the national health care system to the insurance model prompted the study of the experience of developed countries. The research showed that the effectiveness of an insurance protection is determined by the large variety of insurance organizations. The reliability of insurance protection is achieved to the greatest extent, when alongside joint-stock companies non-profit insurance organizations (whose goal is not to make a profit, but to compensate the losses of their members on the basis of reciprocity) do operate. The activity of non-profit organizations in the field of health insurance was studied in the context of their potential implementation in Ukraine.

Scientific analysis of non-profit insurance forms is related to the determination of their economic and social goals, scope and dynamics of distribution in the modern world. The theoretical foundations of non-profit insurance are the subject of research by H. Hansmann[4], R. McMinn and R. Yayuan[5], S. Levantesi and G. Piscopo[6], L. Duque-Zuluaga and U. Schneider[7]. The works of Marco H.D. van Leeuwen and A. Talonen are devoted to its development in historical and international context[8,9]. The global practice of life and health insurance by non-profit organizations is highlighted by E. Archambault and S. Rago[10,11]. The research of A. Sagan and S. Thomson studied the European experience of voluntary health insurance[12]. Publications of domestic scientists (A. Panteleimonenko, S. Tsyhanov, I. Tymoshenko, O. Panchenko[13-16]) reveal the international experience of non-profit insurance. The field of medical insurance itself remains, however, outside of the attention of scientists.

The purpose of this research is to define the dynamics, potential and prospects of non-profit health insurance development as an alternative model of insurance in developed countries; to determine its organizational and legal forms and the range of provided services; to substantiate its efficiency factors within the framework of its implementation into national insurance practice

Results and their discussion

Non-profit insurance companies (NPICs) are defined as a risk-sharing network in which a group of individuals with similar vulnerability profiles pool their insurance contributions to prevent potential danger[6]. A. Talonen defines them as «mutual distribution of risk between clients and owners, structured for their benefit as consumers»[9]. Practically, it means that NPICs are formed by a certain number of people, with common insurance interests and financial capabilities in order to reduce the costs of insurance services. The similarity of insurance risks by industrial or professional affiliation (hotel owners, small business entrepreneurs, farmers, doctors, lawyers, etc.) simplifies identifying the causes of risks and creates potential opportunities for their minimization.

The analysis of NPCs' activities revealed that their features caused by a combination of the properties of financial and non-profit organizations. As financial institutions, they create statutory and insurance funds, form reserves, conduct insurance operations, which, naturally, is related to making a profit. As collectively owned business entities, they serve their members on a non-profit basis. Therefore, the methods of their formation and financial management have their own specificity. A general idea of the functioning mechanism of non-profit insurance organizations is schematically shown at **figure 1**.

Figure 1: The mechanism of functioning of non-profit insurance organizations.
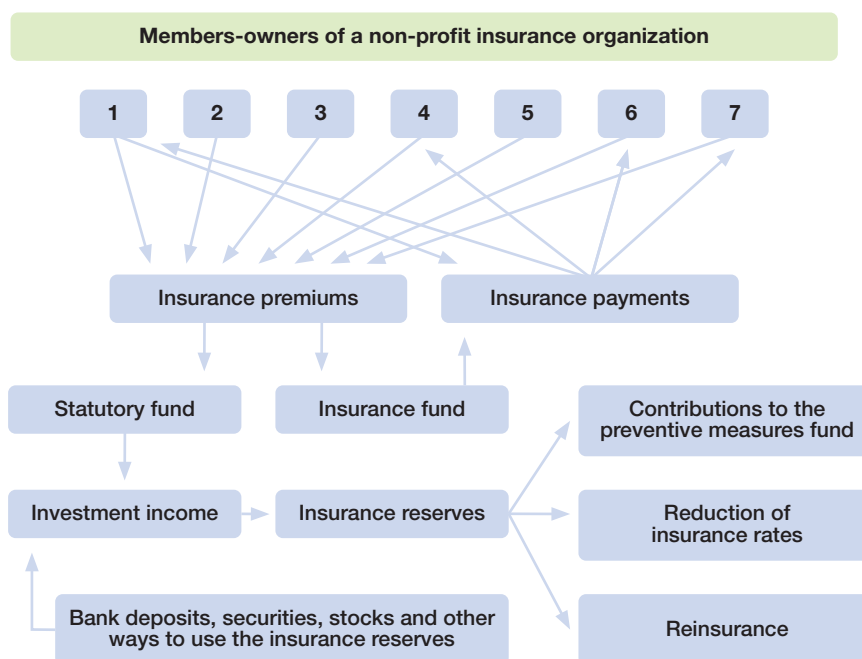
The presented scheme demonstrates the interaction and directions of use of insurance funds based on the mechanism of self-sufficiency of insurance operations. The insurance fund is formed by members at the expense of entrance contribution, the amount of which is determined in proportion to the expected amount of insurance compensation. As they replenish, the insurance reserves become a source of investment. Assets and income are not distributed among participants, but are directed to the expansion of medical services and reduction of their cost. As a result, the specific financial and economic mechanism is formed, which provides the foundation for the implementation of non-profit activities[17].

Economic principles determine such specifics of insurance relations:
1) collective formation of the insurance fund actually makes all participants the co-owners, which gives them a right to determine the insurance policy of an organization and set the size of contributions; 2) joint ownership presupposes joint responsibility for paying the insurance indemnities; 3) collegial management guarantees the transparency of NPICs' activity4. Mentioned features determine the competitive advantages of NPICs and strengthen the motivation of certain segments of population to choose this particular form of insurance protection.

An objective analysis of non-profit insurance also requires characterizing its weaknesses. The amount of the entrance contribution depends on the number of founders, which also requires a sufficient number of members, but can cause certain difficulties. Exceeding the actual losses over the expected ones requires additional funds or will cause the incomplete payment of insurance compensation. In case of large financial losses, it becomes a significant issue and appears to be a serious disadvantage, comparing to the fixed rates of a commercial insurer. There are possible difficulties with attracting resources to the reserve fund. At the same time, obtaining additional capital by issuing shares, as is done in commercial insurance, is impossible for NPICs, as it leads to the loss of the non-profit insurance organization status.

Studying the international practice showed that financial instability of NPICs is mostly observed during the first years of their activity. As the number of participants increases, the size insurance payments decreases, and on the contrary, the financial stability of the company increases. In some countries, NPICs are allowed to attract loan funds for conducting business. Requirements for the minimum size of the statutory capital of NPICs are several times smaller, compared to those for joint-stock companies. Moreover, national legislations provide tax benefits to non-profit insurers, considering their social focus. So, after comparing the advantages and disadvantages of mutual and joint insurance, policyholders can choose a more acceptable option for themselves.

Non-profit insurers operate in various organizational and legal forms. Most of them are represented by mutual insurance companies and insurance cooperatives. Together, they form the mutual insurance sector, and occupy about 27% of the global market of insurance

services. The activities of such organizations are coordinated by the number of international and regional associations, which also represent their interests. The International Cooperative and Mutual Insurance Federation (ICMIF), which has 212 representative offices in 73 countries of the world, is the most influential among them[18].

The scale and dynamics of NPICs' distribution is based on the report «Global Mutual Market Share 10» published by ICMIF for its 100-year anniversary, which it celebrated in April 2022[19]. According to their data, non- profit insurance sector shares almost 30% of the European insurance market, 39% of the North American market and up to 15% of the Japanese market of insurance services, serving more than 950 million policyholders in 90 countries of the world. The total amount of insurance premiums of non-profit insurance organizations reached 1,26 trillion USD. The total value of their assets amounted to 8,3 trillion USD, which is about a third of the whole insurance industry. The number of NPICs reaches 5100 organizations, 2800 of which operate in Europe, and 1900 in North America (1788 of which in the USA). The predominant spread of NPICs is observed in economically developed regions of the world. The largest number of non-profit insurance operations in Europe has Sweden (52%), Finland (43%), France (39.4%), the Netherlands (25%), Austria (23.6%), and Germany (22%). In 2020 alone, European mutual insurers paid out 469 billion EUR in insurance premiums, including 200 billion EUR in life insurance[20]. The indicators of their activity in certain regions of the world are presented in **table I.**

Table I: The main indicators of non-profit forms of insurance on the regional markets of insurance services[19].

Region	Number of non-profit insurers	Number of insurance policies (mln)	Regional share of insurance market (%)	Insurance premiums (USD, mln)
Asia & Oceania	200	116	13.2	220,364
Latin America	90	26	11.2	22,456
Africa	40	6	2.7	1,296
Global Market	**5100**	**955**	**26.7**	**1,285854**

During the global financial crisis of 2008-2009, when insurance organizations went bankrupt in masse, not-for-profit insurance companies not only maintained their positions, but also showed a growth trend. In the 10-year post- crisis period, the revenues of mutual insurers increased by 30% compared to only 17% growth of the insurance industry as a whole. Foreign analysts explain this feature by the competitiveness of non-profit insurers and their ability to quickly adapt in theainterests of their clients[21].

A comparative analysis of health insurance models with the participation of NPICs revealed that their activities in the countries of Western Europe, the USA and Japan have certain differences in organizational forms, provision of insurance services, regulatory and legal support.

In the field of health insurance in Europe, there function mutual insurance societies, hospital funds, mutual aid insurance societies, friendly societies, and mutual health insurance societies. They provide both mandatory and supplementary health insurance services: cover health-related risks (from accidents to life insurance), compensate for damages in case of a long-term illness or disability. According to the European Commission, these organizations cover 25% of the health insurance market and 19% of the life insurance market, serving more than 120 million people[22].

An important aspect within the framework of the investigated problem is the issue of state regulation of non-profit medical insurance. Conceptual approaches are contained in the document of the European Parliament «The role of mutual societies in the 21st century», which defines the importance of the participation of NPICs in the state programs of the EU countries and outlines the prospects for their development. In particular, it is envisaged to expand the scope of medical services and promote the model of non-profit insurance in those countries where it is not yet available[23]. Legal requirements for mutual insurance companies are regulated by the directives of the European Commission. Each country also has a special legislative framework due to national characteristics.

Mutual insurance companies dominate in France, Belgium, Denmark, Ireland, Italy, Slovenia, providing services to 230 million European citizens. In France alone, there are 426 societies united by the Federation of Mutual Relations (La Fédération nationale de la Mutualité Française), which provides health insurance to 38 million people, that is, almost 50% of the country's population. In addition to providing insurance services, mutual organizations operate their own medical facilities, such as hospitals, pharmacies, laboratories, dental offices and nursing homes[24].

Mutual aid societies are closely related to the implementation of state health insurance programs. The scale of their activities depends on the sources of financial support. In the countries of Central and Eastern Europe, it occurs at the expense of employers and employees; in Scandinavia and some Mediterranean countries –through taxes to national health insurance services. In Germany,

the Netherlands, Belgium, Slovakia, and Czech Republic, they are involved in mandatory health insurance, supplementing the public health insurance sector. This variety is typical not only for European countries. The International Association of Mutual Benefit Societies (AIM), which has been operating since 1950, currently has 63 associate members from 28 countries representing around 200 million policyholders in Europe and more than 240 million from Africa, the Middle East, North and Latin America. The strategic goal of the association is to create conditions for the availability of medical services and social support for the population around the world[25].

In many European countries, non-profit health insurance in form of hospital funds provided the basis for the mechanism of mandatory health insurance. A good example of this is the health insurance system in Germany. The state creates conditions for forming the insurance funds, and their provision is entrusted to hospital funds as self-governing financial and credit institutions. Funds are financed on the basis of joint contributions of members. All means are directed to the general fund, from which each hospital fund receives them in proportion to the number of people insured. Governing bodies are formed on the basis of election among those who pay contributions. The board determines the scope of diagnostic and treatment services, the form of interaction with medical institutions, the basic rates of insurance contributions, etc. The organizational structure of the funds is based on a professional or territorial basis. The key point is the right to freely choose the hospital fund, and even change it after the 18-month contract period. Therefore, competing for the number of members, each hospital fund focuses on their needs and not their ability to pay, and creates competitive advantages due to the quality of the medical services provided[26]. The considered mechanism of interaction between policyholders and medical funds is based on the principles of solidarity, non-profitability and self-governance, which are decisive in non-profit insurance.

In the field of additional health insurance, which provides insurance in case of diseases not covered by traditional insurance (diabetes, viral hepatitis, tuberculosis, oncology), mutual health insurance companies –«health mutuals»– stand out separately. They are also often called «providence mutuals» (from English providence – foresight). The uniqueness of these companies lies in the peculiarities of insurance compensation. It often does not involve a monetary payment, but the provision of services in form of medical care, assistance to sick patients and elderly people. The greatest development of «health mutuals» was achieved in Denmark, Ireland, Luxembourg, the Netherlands, Finland, France, and Italy. Their activities are regulated by special national legislative acts[11].

Along with these societies, there also are so-called «friendly societies» – mutual aid organizations created more than a century ago to protect their members from debts caused by illness, old age or the death of loved ones. Some of them are small local organizations, other have branches all over the country. The atractiveness of friendly societies is explained by the fact that their activity is based on the idea of self-help. Their mission is to help their members adjust the level of medical care, the range of services and the amount of insurance coverage, based on their individual financial capabilities and wishes[27].

The analysis of the European model of health insurance demonstrates that it is defined by the variety of forms and the range of provided services. Social orientation and public trust contributes to the growth of NPICs. Their participation in voluntary health insurance is assessed by the governments of EU countries as additional assistance in implementing state social programs.

The spread of non-profit forms of insurance in the field of health care of the USA is affected by the lack of a unified system of state health insurance and the dominant role of the medical services' market. The state provides insurance support under the Medicare and Medicaid programs only to socially vulnerable groups of population (people over 65 years old; disabled people, women and children living below the poverty line). More than 50 million Americans (16% of the population) are uninsured and bear the entire burden of medical expenses personally, and 77 million have so-called «intermittent insurance», which automatically stops when they lose their jobs. For the uninsured, medical care is extremely expensive (treating a broken leg can cost up to 7500 USD and a three- day hospital stay can cost more than 30000 USD)[28]. The U.S. health insurance system is closely tied to an employment, and job loss automatically results the loss of health insurance. The sharp increase in unemployment caused by the COVID-19 pandemic has exacerbated the negative consequences of not having an insurance policy.

There are two types of insurers in the US health insurance market: corporate joint-stock insurance companies and mutual insurance companies (the term «company» is used in both cases within the US sources). Joint-stock companies carry out insurance on the basis of joint financing of insurance programs by the enterprise and the employees. The list and range of medical services is usually quite limited (the most common insurance policies include only ten basic medical services). As a result, the role of non-profit forms of insurance is increases.

Historically, all American insurers originated as mutual insurance companies. But over the past 25 years, the insurance industry has undergone major changes. Some mutual insurance companies went corporate. At the same time, the transformation of joint-stock companies into mutual companies took place, caused by resistance to takeover by transnational capital. Some insurers have retained their cooperative status. Therefore, the organizational and legal form of an insurance organization

(joint-stock, mutual or cooperative) is not always clearly reflected in its title.

Mutual insurers specializing in health insurance can be divided into three groups: 1) life and health insurance companies; 2) companies that offer a wide range of medical services; 3) companies dealing with accident risk insurance and additionally health insurance programs. The largest are mutual life insurance companies. By the end of 2021, 109 such companies were operating in the country. They offer not only insurance policies, but also medical services through an affiliated medical network of clinics, hospitals, rehabilitation centers and pharmaceutical departments. To imagine the scale of their activity, we provide the data of one of the largest non-profit health insurers in the USA – «Kaiser Permanente». The company has more than 12 million customers, manages 39 hospitals, 700 other medical facilities and has treated almost 600000 patients with COVID-19[29].

Some insurers operate in the form of cooperatives – private non-profit insurance companies with a state license. Cooperatives differ in size and scope of activity. The largest of them have several thousand members and manage millions in assets, but their service territory is limited, as a rule, to one or two states. The absence of significant administrative costs and tax obligations, settlements with medical institutions for the services actually provided reduces the amount of insurance premiums, which gives them an advantage in competition with private insurers. However, a serious disadvantage is the lack of insurance payment guarantees for the members of a cooperative in case of lack of funds. Evaluating the value of non-profit forms of medical insurance, we note that they contribute to the formation of a full-fledged competitive environment, create a serious opposition to the significant concentration of joint-stock companies and restrain the unjustified increase in prices for insurance services.

The peculiarity of non-profit health insurance in Japan cosnsists in fact that, until recently, the dominant position was occupied by Zenrosai federation of insurance cooperatives, which was subordinate to the Ministry of Health, Labor and Welfare of Japan. The Japanese have traditionally turned to them due to lack of a social insurance system in the country. After the reform, Dai-Ichi Mutual Life Insurance Company and Nippon Life Insurance Company took the leading positions in terms of the amount of insurance premiums and the number of sold insurance policies. They have more than 19 million concluded insurance contracts, i.e. approximately every sixth resident of the country is insured in one of these two companies. Zenkyoren cooperative insurance company was recognized as the largest company in the Global 500 world rating for 2019.

Today, non-profit insurers are facing a number of new challenges, related to the strengthening of capital requirements and risk assessment, introduction of corporate governance standards for mutual companies, which puts them at a competitive disadvantage. Specialists see their future in accelerating the pace of technological changes and use of digital technologies; which will contribute to the consolidation of small companies and preserve their position on the market[30]. The main types of medical insurance in Ukraine are regulated by the Law of Ukraine «On Insurance», which also provides for the possibility of creating mutual insurance companies (Article 14)[31]. However, the «Regulation on mutual insurance societies» developed on its basis is intended to insure commercial rather than medical risks. The revival of medical funds in the form of hospital funds also did not find any support. At the same time, the monopolization of a domestic market by joint-stock insurance companies has a negative effect on the nature and trends of its development, reduces the level of competition and limits the choice of citizens to the most optimal form of insurance for them. Prospects for the implementation of non-profit health insurance model were determined considering the positive experience of developed countries.

There are different points of view regarding the expediency of creating non- profit insurance organizations in the field of health care. Critics of this proposal believe that since the activities of such insurers are not legally regulated and not controlled by state authorities, they can become a source of abuse and financial violations. In our opinion, democratic management and control by the members of NPICs, on the contrary, will contribute to the effective use of financial resources and ensure the targeted direction of available funds.

The organizational and legal forms of non-profit insurance in Ukraine could be already tested in the domestic practice mutual insurance companies or hospital funds, which on the basis of public and solidarity participation, will contribute to ensuring the availability and quality of medical services. Membership in such organizations is attractive primarily for socially vulnerable groups of population groups and allows them to a certain extent reduce the personal costs of treatment. No joint-stock company will offer better insurance conditions than those determined by the policyholders themselves. In addition, nonprofit health insurance networks are more focused on primary and preventive care than other types of insurance organizations. The adjusted health insurance system is a platform for further reforming of the national health care system.

Conclusions

1. Conducted research shows that in the modern world non-profit insurance has acquired the status of an international phenomenon. Non-profit insurance companies operate in various organizational and legal

forms and create a relevant sector on the international markets of insurance services. The economic principles of their functionning provide the foundation for non-profit activities, which reduces the cost of insurance premiums, establishes joint responsibility and ensures democratic self-governance. Mentioned features determine the competitive advantages of non-profit insurers and strengthen the motivation of certain people to choose this particular form of insurance.

2. The practice of developed countries regarding the use of non-profit insurance principles, while forming a system of mandatory health insurance through the involvement of mutual insurance companies and hospital funds deserves attention. The experience of non-profit insurance companies related to the implementation of state programs in the field of additional health insurance can also be useful. The model of non-profit insurance is focused on the availability of insurance services to broad segments of population, regardless of their income level, and creating more flexible insurance conditions, based on the individual needs and financial capabilities of its participants. Unfortunately, the vast majority of Ukrainian population is not very familiar with the non-profit forms

of insurance, and the indifference of state authorities to this issue is caused by the lack of understanding of its importance for the development of health insurance.

3. While implementing medical reform, it is important for Ukraine not only to consider the positive global experience, but also national peculiarities, such as the level of economic development and self-organization of the population, demographic and social indicators, etc. Considering the international practice, a combination of the capabilities of state, joint-stock and non-profit insurers, in our opinion, would better meet the social needs in insurance protection. Further research can be aimed at developing a health insurance mechanism that would ensure the optimal ratio of all models of insurance protection.

Conflicts of interest
Authors have no conflicts of interest to disclose.

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ORIGINAL

Urine sediment crystals in Bitola, North Macedonia: results from 3200 urines made with LabUMat 2 & Urised 3 Pro

Cristales de sedimento urinario en Bitola, Macedonia del Norte: resultados de 3.200 orinas realizadas con LabUMat 2 & Urised 3 Pro

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Summary

Introduction: Urine sediment testing is a diagnostic medicine that remains a long-standing practice in clinical laboratories. Urine analysis, which is an important test in clinical medicine, is used in screening, diagnosing and monitoring diseases of the urinary system, and diseases that are detected through the urinary system. We use the performance of a new model of UriSed (also sediMAX) automated microscope called UriSed 3 PRO. Thus, this paper presents a case of interest for clinical laboratory practice, as it demonstrates the utility of urine sediment examination as a diagnostic tool in the evaluation kidney disease. Therefore, we summarized the data from 3200 urinalysis and our aim was to evaluate the distribution of urinary crystal components and different crystal forms according to the age and gender of the patients.

Methods: The study was performed using 3200 urine samples collected into the clean tubes without preservatives, which have been obtained from the patients applied to Hospital for routine visit. The patients left the urine samples and we pipette 10 mL into test tubes. The samples were analyzed every day in small batches for six months in 2023.The urine sample were analyzed in an hour at the latest.

Results: Of the 3200 urines analyzed, 2000 females and 1200 males. 2079 of them were free of crystals and 1121 urines were with crystals and were included in the analysis. 67% were mostly calcium oxalate dihydrate crystals, followed by calcium oxalate monohydrate 22%, followed by 11% triple phosphate crystals and 0.01% uric acid crystals. The majority of crystals were detected in males (37%) versus females (33%). Calcium oxalate dihydrate crystals (26% vs.22%) was the most common major component in both men and women, followed by crystals of calcium oxalate monohydrate (8% vs.7%).

Conclusion: The most abundant crystals in the urine in our study were found to be calcium oxalate crystals, followed by tripel phosphate and uric acid. The highest incidence of crystals is in patients aged 61 to 70 years. The male gender is more affected compared to the female gender. The distinction between different crystal forms can provide clues to the activity and mechanisms of the lithogenic process. Knowledge of the mechanisms of crystal and stone formation is necessary in order to provide appropriate individualized treatment to each patient and to prevent their recurrence.

Key words: Urine sediment testing, Calcium oxalate monohydrate crystals, Calcium oxalate dihydrate crystals, Triple phosphate crystals, Uric acid crystals.

Resumen

Introducción: El análisis del sedimento urinario es una prueba diagnóstica que sigue siendo una práctica arraigada en los laboratorios clínicos. El análisis de orina, que es una prueba importante en la medicina clínica, se utiliza en el cribado, diagnóstico y seguimiento de enfermedades del aparato urinario y de enfermedades que se detectan a través del aparato urinario. Utilizamos el rendimiento de un nuevo modelo de microscopio automatizado UriSed (también sediMAX) denominado UriSed 3 PRO. Así, este trabajo presenta un caso de interés para la práctica del laboratorio clínico, ya que demuestra la utilidad del examen del sedimento urinario como herramienta diagnóstica en la evaluación de la enfermedad renal. Por lo tanto, resumimos los datos de 3200 análisis de orina y nuestro objetivo fue evaluar la distribución de los componentes de los cristales urinarios y las diferentes formas de cristales según la edad y el sexo de los pacientes.

Métodos: El estudio se realizó utilizando 3200 muestras de orina recogidas en tubos limpios sin conservantes, obtenidas de pacientes que acudieron al hospital para una visita rutinaria. Los pacientes dejaron las muestras de orina y pipeteamos 10 mL en tubos de ensayo. Las muestras se analizaron todos los días en pequeños lotes durante seis meses en 2023.La muestra de orina se analizaron en una hora a más tardar.

Resultados: De las 3200 orinas analizadas, 2000 eran de mujeres y 1200 de hombres. 2079 de ellas estaban libres de cristales y 1121 orinas estaban con cristales y se incluyeron en el análisis. El 67% eran en su mayoría cristales de oxalato cálcico dihidratado, seguido de oxalato cálcico monohidratado 22%, seguido de un 11% de cristales de fosfato triple y un 0,01% de cristales de ácido úrico. La mayoría de los cristales se detectaron en varones (37%) frente a mujeres (33%). Los cristales de oxalato cálcico dihidratado (26% frente a 22%) fueron el componente principal más frecuente tanto en hombres como en mujeres, seguidos de los cristales de oxalato cálcico monohidratado (8% frente a 7%).

Conclusión: Los cristales más abundantes en la orina de nuestro estudio fueron los de oxalato cálcico, seguidos de los de tripel fosfato y ácido úrico. La mayor incidencia de cristales se da en pacientes de 61 a 70 años. El sexo masculino está más afectado que el femenino. La distinción entre las diferentes formas cristalinas puede proporcionar pistas sobre la actividad y los mecanismos del proceso litogénico. El conocimiento de los mecanismos de formación de cristales y cálculos es necesario para proporcionar un tratamiento individualizado adecuado a cada paciente y prevenir su recurrencia.

Palabras clave: Análisis de sedimento urinario, Cristales de oxalato cálcico monohidratado, Cristales de oxalato cálcico dihidratado, Cristales de fosfato triple, Cristales de ácido úrico.

Introduction

Urine sediment testing is a diagnostic medicine that remains a long-standing practice in clinical laboratories. Urine analysis, which is an important test in clinical medicine, is used in screening, diagnosing and monitoring diseases of the urinary system, and diseases that are detected through the urinary system[1]. The use of automated urine analyzers has become a clinical standard in medium and large laboratories; they count cells using flow cytometry or several types of image analyzers. Urinalysis is used routinely in daily practice to detect hematuria and proteinuria, which are initial signs of kidney disease, but its importance is invaluable in assessing the morphology of urinary erythrocytes and in distinguishing glomerular disease from non-glomerular disease[2].

We use the performance of a new model of UriSed (also sediMAX) automated microscope called UriSed 3 PRO (77 Elektronika, Budapest, Hungary, represented by Mediq Ltd in Finland) launched in 2018, that takes phase-contrast images on urine particles, by using urine samples from our routine of mixed patient populations. Our practice has recently introduced the UriSed2 analyzer which captures images of urine centrifuged in a disposable tube with a digital camera attached to a bright field microscope at 400× magnification. The sediment is processed with image processing software. The images are then rechecked by a technician, when necessary. The analyzer software detects red blood cells (RBC), white blood cells (WBC), squamous epithelial cells (EPI), crystals, and cylinders[3,4].

We analyzed the end products of metabolism are found highly concentrated in the urine and can precipitate in the form of crystals. The presence of crystals does not always indicate pathological conditions, but several types of crystals are associated with certain diseases and with the risk of stones. Thus, this paper presents a case of interest for clinical laboratory practice, as it demonstrates the utility of urine sediment examination as a diagnostic tool in the evaluation kidney disease. Therefore, we summarized the data from 3200 urinalysis and our aim was to evaluate the distribution of urinary crystal components and different crystal forms according to the age and gender of the patients.

Materials and methods

The study was performed using 3200 urine samples collected into the clean tubes without preservatives, which have been obtained from the patients applied to Hospital for routine visit. The patients left the urine samples and we pipette 10 mL into test tubes. The samples were analyzed every day in small batches for six months in 2023. The urine sample were analyzed in an hour at the latest.

Statistical analyses

Categorical variables are presented as percentages. The effect of age and gender on different crystals in urine types was assessed by the Chi-squared test. For analysis we used Fisher's exact test and it was used if the Chi-square test was not applicable. The significance level was considered as $p < 0.05$. Statistical analysis was performed using SPSS for Windows, version 27.

Results

Crystal composition in urines

Of the 3200 urines analyzed, 2000 females and 1200 males. 2079 of them were free of crystals and 1121 urines were with crystals and were included in the analysis. 67% were mostly calcium oxalate dihydrate crystals, followed by calcium oxalate monohydrate 22%, followed by 11% triple phosphate crystals and 0.01% uric acid crystals presented in **table I**.

Gender

The majority of crystals were detected in males (37%) versus females (33%). Calcium oxalate dihydrate crystals (26% vs.22%) was the most common major component in both men and women, followed by crystals of calcium oxalate monohydrate (8% vs.7%). Crystals of calcium oxalate monohydrate and calcium oxalate dihydrate were more often obtained from men than women (p < 0.001). Crystals of triple phosphate crystals were more often obtained from women than in males.

Age

The peak incidence of crystals in both women and men were between the ages of 61 and 70 years. Age trends in crystals distribution were similar in both genders for most crystals types. Calcium oxalate dihydrate was the

Table I: Distribution of urine crystals ($n = 1121$).

Main components	Urine without crystals					Urine with crystals				
	All	Females	%	Males	%	All	Females	%	Males	%
Calcium oxalate monohydrate crystals	2958	1859	93	1099	92	242	141	7	101	8
Calcium oxalate dihydrate crystals	2443	1555	78	888	74	757	445	22	312	26
Triple phosphate crystals	3087	1922	96	1165	97	113	78	4	35	3
Uric acid crystals	3191	1997	99	1194	99	9	3	0	6	0

most common main stone component in both genders and all age groups. While crystals of calcium oxalate monohydrate was second most frequently obtained from patients 61- 70 years old. The occurrence of triple phosphate crystals increased strongly in men and women ≥ 60 years old (**Figure 1**).

Figure 1: Association of gender and age with stone type.

a: Total

b: Males

c: Females
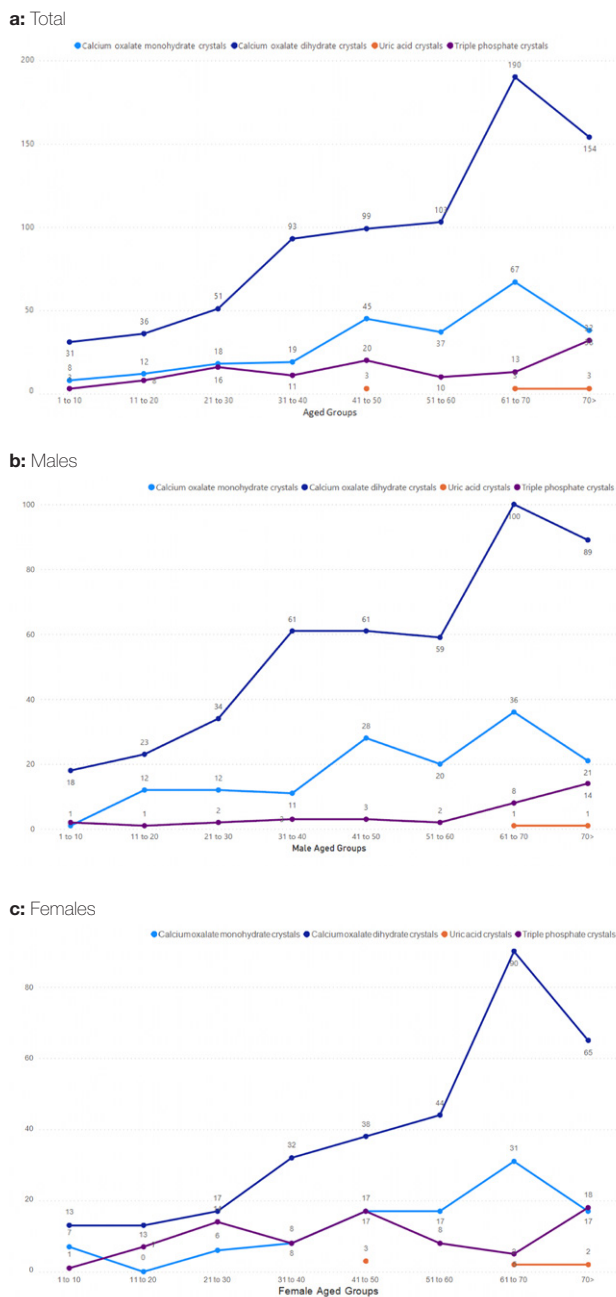
Discussion

Urine sediment analysis with the advent of automated urine analyzers is performed more quickly, reducing potential analysis variations and increasing precision and accuracy. However, manual microscopy remains the "gold standard" despite methodological problems and

shortcomings[5,6]. Manual microscopy is labor-intensive, time-consuming, large inter-technician variation has been observed, and has low reproducibility[7]. At the moment, automated urine analyzers are used in the world, which allow us better productivity, increased reproducibility and reduced time and effort required for processing urine samples[8,9]. The analysis of urine sediment and specifically crystals in urine allows us to get to know the frequency of different forms of hydrates and how demographic factors affect them, and thus we would have a more accurate idea of the etiology, therapy and prevention of the recurrence of stone disease in the kidneys. The current study presents the latest data on the characteristics of urine sediment and specifically urine crystals in patients in Bitola, Macedonia.

Previous studies have analyzed the distribution of urinary stone types in different countries and found that calcium oxalate is the most commonly diagnosed stone, followed by carbonate apatite and uric acid stones. Calcium oxalate was the most common major urinary crystal in both sexes in our study, accounting for 89% of all crystals submitted. The incidence of calcium oxalate crystals is higher in men. Numerous studies confirm the high percentage of calcium oxalate stones especially in male respondents[10-12]. In our study, the majority of calcium oxalate crystals were calcium oxalate dihydrate crystals compared to calcium oxalate monohydrate crystals with a ratio of approximately 3:1 in both sexes. The tendency to develop a calcium oxalate crystal is associated with specific urinary risk factors. Recent studies have suggested that hyperoxaluria may contribute to the formation of calcium oxalate monohydrate crystals[13,14], while hypercalciuria leads to the formation of calcium oxalate dihydrate crystals and stones[13-15]. Osteopontin, which is an inhibitor of calcium oxalate stone synthesis, modifies the kinetics of calcium oxalate crystallization and prevents the formation of calcium oxalate dihydrate [16]. With advancing age are decreasing levels of osteopontin in the blood leading to higher proportions of calcium oxalate dihydrate with increasing age[17]. This was confirmed in our study, as the most frequently affected age group in which crystals were detected in urine are patients over 60 years of age.

Triple phosphate crystals are the second most common crystals found in urine samples in our study, they are composed of magnesium ammonium phosphate. Their mechanism of occurrence has been explained in numerous studies and it has been proven that in conditions of bacterial infection of the urinary tract caused by *Proteus mirabilis*, *K. pneumoniae* or *Corynebacterium*, urease is created, it breaks down urea in the urine to carbon dioxide and ammonia. Ammonia together with water creates ammonium hydroxide, it increases the pH in the urine, it becomes alkaline. In our study, we observed triple phosphate crystals to be more common in women, and this is confirmed by

other studies that have linked the presence of triple phosphate crystals in urine to patients at high risk of developing urinary tract infections, such as those with neurogenic bladder, urinary diversion, or indwelling Foley catheter[18,19].

Uric acid urine crystals are the rarest urinary crystals in our study. They are slightly more common in men than in women. According to the scientific literature, they are found in 10 to 11% of all kidney stones[20] and this percentage increases with advancing age[21]. The appearance of these crystals is associated with low urine pH, followed by hyperuricosuria and low diuresis[22-24], but there is not a small number of patients in whom their appearance is idiopathic and not associated with hyperuricosuria or low diuresis[25].

Conclusion

The most abundant crystals in the urine in our study were found to be calcium oxalate crystals, followed by tripel phosphate and uric acid. The highest incidence of crystals is in patients aged 61 to 70 years. The male gender is more affected compared to the female gender. The distinction between different crystal forms can provide clues to the activity and mechanisms of the lithogenic process. Knowledge of the mechanisms of crystal and stone formation is necessary in order to provide appropriate individualized treatment to each patient and to prevent their recurrence.

Conflicts of interest

Authors have no conflicts of interest to disclose.

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ORIGINAL

Eating habits in immigrants living in South of Spain: a mixed-methods study

Hábitos alimentarios en inmigrantes residentes en el sur de España: un estudio de métodos mixtos

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Summary

Objectives: To investigate the eating habits of different immigrants' subgroups living in Southern Spain, considering variables such as sex, country of origin and length of residence in the host country.

Methods: This cross-sectional descriptive study with mixed methodology was conducted between 2017 and 2019 using self-administered anonymous questionnaires for the quantitative survey and face to face interviews for the qualitative study. A total of 249 immigrants participated in the quantitative phase and 30 of them participated in the qualitative phase. Sociodemographic, type of diet, eating habits and health problems were evaluated. A multiple correspondence analysis were used.

Results: Those immigrants living in Spain for a longer time tended to consume more Spanish food and those men consumed more alcohol. Asian immigrants ate more in their workplaces and consumed more origin food and alcoholic beverages, Africans tended to consume less alcohol due to cultural beliefs, and Latinos consumed more Spanish food and more fat foods.

Conclusions: The eating habits of immigrants living in Southern Spain can vary according to their sex, country of origin and length of residence. Government should be aware of the reasons for these diet patterns and which strategies could be used to mitigate eating problems. Knowing the eating patterns of the immigrant population by nurses, presents an opportunity to develop cultural competence in clinical practice. This can help to maintain health and address health problems through healthy eating. All of these efforts can ultimately contribute to improving the quality of care perceived by patients.

Key words: Eating habits; Immigrant health; Social determinants health; Transcultural nursing.

Resumen

Objetivos: Investigar los hábitos alimentarios de diferentes subgrupos de inmigrantes que viven en el sur de España, considerando variables como el sexo, el país de origen y el tiempo de residencia en el país de acogida.

Métodos: Este estudio descriptivo transversal con metodología mixta se llevó a cabo entre 2017 y 2019 utilizando cuestionarios anónimos auto administrados para la encuesta cuantitativa y entrevistas cara a cara para el estudio cualitativo. Un total de 249 inmigrantes participaron en la fase cuantitativa y 30 de ellos participaron en la fase cualitativa. Se evaluaron los datos sociodemográficos, el tipo de dieta, los hábitos alimentarios y los problemas de salud. Se utilizó un análisis de correspondencias múltiples.

Resultados: Los inmigrantes que llevaban más tiempo viviendo en España tendían a consumir más comida española y los hombres consumían más alcohol. Los inmigrantes asiáticos comían más en sus lugares de trabajo y consumían más comida de origen y bebidas alcohólicas, los africanos tendían a consumir menos alcohol debido a creencias culturales y los latinos consumían más comida española y más alimentos grasos.

Conclusiones: Los hábitos alimentarios de los inmigrantes que viven en el sur de España pueden variar en función de su sexo, país de origen y tiempo de residencia. Las administraciones públicas deberían conocer las razones de estos patrones alimentarios y qué estrategias podrían utilizarse para mitigar los problemas alimentarios. Conocer los patrones alimentarios de la población inmigrante por parte de las enfermeras, presenta una oportunidad para desarrollar la competencia cultural en la práctica clínica. Esto puede ayudar a mantener la salud y a abordar los problemas de salud a través de una alimentación saludable. Todos estos esfuerzos pueden contribuir, en última instancia, a mejorar la calidad de la atención percibida por los pacientes.

Palabras clave: Hábitos alimentarios; Salud de los inmigrantes; Determinantes sociales de la salud; Enfermería transcultural.

Introduction

Eating habits can lead to serious repercussions on the development, reproduction, and physical and intellectual performance of individuals, influencing the morbidity and mortality of the population[1]. When eating habits lead to excessive consumption of foods high in saturated fats, salt, and sugar, and lower intake of fiber, minerals, vitamins, and antioxidants[2], they are related to the development of chronic non communicable diseases (CN-CDs), such as overweight/obesity, diabetes mellitus, gastrointestinal disorders, cardiovascular diseases, and certain types of cancer, causing the death of 41 million people every year[3,4].

On the other hand, eating habits could also result in important nutritional deficits that may affect vulnerable population all over the world. This is a concern for the United Nations which included them in the Sustainable Development Goals (SDG) of the 2030 Agenda[5]. In 2015, 72 countries achieved the goal of halving the proportion of people suffering from chronic undernutrition, proving to be a significant progress in goal number 2 of the SDGs, reducing acute malnutrition by 8% over the last 10 years, in addition to a 40% reduction in stunted children under 5 years of age.Despite this promising achievement, the Food and Agriculture Organization of the United Nations (FAO) in its report on the State of Food Security and Nutrition in the World 2021 has pointed out that the path to eradicate hunger and malnutrition by 2030 has deviated from its progress due to interstate sociopolitical conflicts, climate change, changes in eating habits, or economic crises[6].

In this context, migrant populations stand out as a vulnerable population concerning eating patterns and eating habits. The precariousness of living conditions commonly observed in some immigrant households is associated with high rates of morbidity and is aggravated by the difficulty of access to health services[7]. In Spain, approximately 22.6% of Spanish origin citizens are below the poverty risk threshold, as compared to 43.4% of EU immigrants and 58% of non-EU immigrants (58%)[8].

These numbers are explained by the poor economic situation of the migrant population combined with factors such as the migratory process, cultural beliefs and perceptions, psychosocial aspects, poor social and material resources, and impaired access to food[9]. All these factors allow immigrants to develop diverse strategies to respond to their food needs, which generates differences in the health of these population subgroups[10].

The heterogeneity of the eating behaviors derived from the acculturation process (integration, assimilation, marginalization or separation) will give rise to differences related to the food cultural integration of the individual who immigrates, that is, the adoption of the dietary patterns of the host country[11-13], and also between first generation migrant populations and that of subsequent generations[14,15].

Immigrants tend to increase their fat intake when living in another country, switching from whole grains and pulses to more hyper processed foods. This is related to different factors such as loss of cultural identity, low economic status, few traditional restaurants in the host country, changes in food preparation, lack of time and acculturation[16]. This switch of diet patterns can lead to serious repercussions on the health of immigrants, increasing rates of cardiovascular diseases, diabetes and obesity[17,18]. Therefore, it is urgent to understand the eating habits of immigrants living in high-income European countries, such as Spain. Government should be aware of the reasons for these diet patterns and which strategies could be used to mitigate the problems arising from this switch and promote health surveillance, control, and identification of the styles of life of this population and its subgroups[13].

However, although there are numerous publications on the health behaviors of immigrants all over the world, Spanish studies are still scarce, particularly while including different immigrant groups altogether. This comprehensive approach could have advantages as compared to single groups surveys, since it can show the whole context and share different perspectives.

The purpose of this study is to bridge this gap by investigating the eating habits of different immigrants' subgroups living in Southern Spain, considering variables such as sex, country of origin and length of residence in the host country.

Methodology

This is a mixed-method design combined a cross-sectional study using a self-administered anonymous questionnaire, and face to face semi-structured interviews in the qualitative phase.

The study was carried out in different cities of Andalusia (Sevilla, Cádiz, and Malaga), in the south of Spain where, according to data from the national institute of statistics as of January 1, 2022, the foreign population constitutes 8.7% of the total population (19).

Procedure

Data collection was carried out between 2017 and 2019 in two phases. In the first phase (i.e., quantitative survey), participants were contacted face-to-face in NGOs and in immigrant-based businesses (bazaars, restaurants, and wholesale businesses), taking approximately 20 minutes to complete the questionnaires concerning eating habits. In the second phase of data collection (i.e., qualitative), semi-structured interviews were carried out with migrants

who voluntarily participated in the first phase, and saturation criteria were used.

In addition to these collection methods, the sampling process was carried out by networks ("snowball sampling"), as it is a population with difficult access[20,21], being the language, the cultural difference, the lack of time, and the distrust of the population determinant barriers while accessing such population[22]. All individuals signed a consent to participate.

Participants

The participants included were immigrants 18 years old or over, who came from Africa, South America, and Asia. The inclusion of mixed geographic contexts was possible because two researchers had previous experience working with migrant populations, collaborated with NGOs providing social and labor assistance to immigrants, and knew key agents in the Asian community in Andalusia. Other inclusion criteria were being residents of Andalusia at the time of the development of the study; being able to communicate and understand the requirements of the study; having the ability to communicate fluently in Spanish, English, or French, and participating in the study voluntarily, after signing the informed consent.

Instruments

Quantitative

The self-administered survey included:

a) Sociodemographic variables: age, sex, country of birth (origin), time living in Spain and income.
b) Anthropometric measures: self-reported weight and height.
c) Type of diet, eating habits and health problems: type of diet; self-perception of the quality of food; food of origin and destination consumed; diet changes for beliefs or health reasons; health problems; places where the main meals of the day are eaten; frequency of consumption of specific foods; reasons for purchasing food products; consumption of alcoholic and nonalcoholic beverages. This questionnaire arises from the unification of the survey used by the Ministry of Agriculture, Fisheries and Food "Food habits of immigrants in Spain"[23] and the questionnaire used with adult Chinese immigrant population of the city of Seville in another previous study[24]. The questionnaire was adapted by translating and retranslation into three different languages: English, French, and Mandarin Chinese.

Qualitative

Furthermore, the interview script for the second phase was adapted from the quantitative questionnaire and included the following questions, among others: "What is the usual diet of the immigrant population in Spain?" , "What kinds of products do you (and other immigrants) consume and where do you buy them?", "What are the main characteristics of your source food?", "Have eating patterns changed after emigration to Spain?".

Data analysis

Quantitative data analysis

The IBM SPSS Statistics 26.0 software program (IBM, Chicago, IL, USA) was used for all statistical analysis.

Continuous variables have been represented using mean and standard deviation, while categorical variables were summarized according to their absolute frequencies and percentages. The Kolmogorov-Smirnov Test was used to check for normality.

Chi-square test and Fisher's test were used for the association between dichotomous and polytomous categorical variables and the Cochran-Armitage test was used for the association between dichotomous and ordinal variables.
v
To verify the differences between the variables sex and age, as well as origin and age, the Mann-Whitney and Kruskal-Wallis U tests were used, respectively. The Sommers D test was applied between the ordinal variables "Percentage of origin's food consumption", identified as dependent, and the variables "Time living in Spain" and "I like Spanish food".

For the multifactorial analysis, a multiple correspondence analysis was carried out between the variables "Time in Spain", "Source of income", "Origin", and "Percentage of food of origin".
No imputations were made for missing values.

Qualitative data analysis

The qualitative analysis of the study was carried out following these steps: 1) familiarization with the data; 2) generation of categories; 3) Search; 4) review and definition of topics; 5) final report[25].

Data was collected through audio recordings and a field diary. Once obtained, a transcription and a literal and theoretical reading were made. Subsequently, a manual categorization was performed. The coded data of each participant were examined and compared with data from all other participants to develop categories of meanings.

Ethical considerations

The Andalusian Biomedical Research Ethics Committee granted permission to conduct the study, considering that this research follows the general ethical principles for studies with humans in Spain and the European Union (Internal code: 0731-N-19).

Results

A total of 249 immigrants participated in the first phase of the study (quantitative) and 30 of them participated in the second phase (qualitative), i.e., 20 individuals searching for assistance or social benefits in NGOs and 10 Chinese business workers.

Descriptive analysis

The sample consisted of 249 immigrants, 81 men (32.5%) with a mean of 34.62 years old (SD 10.78) and 168 women (67.5%) with a mean of 35.48 years old (SD 9.8). A total of 58.3% came from South America, 25% from the African continent, and 16.7% from Asia.

Among the participants, 38.3% have been living in Spain for more than 6 years, 24.2% between 1 and 6 years, and 35.4% for less than 1 year. The comparison between men and women concerning these sociodemographic is shown in **table I**.

Table I: Age, place of origin and time of residence in Spain.

Variable	n	Categories	Men (n=81)	Women (n=168)
			M (SD) or n (%)	M (SD) or n (%)
Age	234		34.62 (10.78)	35.48 (9.8)
Origin	240	Africa South America Asia	17 (28.3%) 43 (30.7%) 19 (47.5%)	43 (71.7%) 97 (69.3%) 21 (52.5%)
Months in Spain	235	Up to 1 year 1 to 6 years More than 6 years	34 (40%) 14 (24.1%) 30 (32.6%)	51 (60%) 44 (75.9%) 62 (67.4%)

Own elaboration

Regarding incomes, 32.1% of the respondents (n=77) did not have any source of income, 33.3% (n=80) had income from work (with the Chinese population standing out compared to the rest of the participants), and 20.8% (n=50) obtained their income from benefits or aid.

Concerning anthropometric measures, 45.8% of the immigrants had a normal or low BMI, 28.7% were overweight and 12.5% showed obesity. No relationship was found between BMI and age, sex, place of eating, percentage of food consumption in the country, area of origin or years in Spain. Most immigrants (75.4%) informed having no restriction as compared to 16.3% who respected some type of restriction due to their beliefs (Africans, for example, do not drink alcohol); 5% were vegetarians, and 1.7% followed another type of diet. Some participants mentioned some dietary restriction to improve the symptoms of some diseases and even the need to be supervised by health professionals for the modification of their eating habits:

(P-17, women,38 years, Ecuadorian): '...I had this problem for many years [ulcerative colitis] and without medication; I take care of myself with a good diet, and I cannot eat spicy food; I have not had a crisis for a long time'.

(P-14, women, 34 years, Colombian): "My diet has affected me. I went to a nutritionist last month to get help because my diet was not good at all, but it is a slow change.'

The quality of the diet in the last year was perceived as good or very good by 60% of the sample, compared to 29.6% as regular and 7.1% as poor/very poor. These perceptions were linked to the concept of a healthy diet unchanged with migration and other habits that should accompany it.

(P-1, women, 31 years, Venezuelan): "I worry about my diet and my physical health: I do sports and physical activities at least five times a week. My physical health is a priority for me".

(P-40, men, 50 years, Moroccan): 'I feel very good: lately my allergies no longer affect me, and I think it is related to having a better diet, doing physical exercises and being able to rest more'.

(P-15, men, 42 years, Brazilian): "The migration has not affected my diet. I continue to eat the same balanced diet so as not to affect my weight. My health status is adequate. I had a medical exam 6 months ago and everything was fine. My health worries me, so I do gymnastics and try to maintain a balance between my health and my diet".

Regarding the integration of the eating habits of the host country, 44.2% of immigrants responded affirmatively when asked if they liked Spanish food; 30.4% responded that they did not like it much and 18.8% liked it a little or not at all. Only four people (1.7%) declared that they had not yet tried Spanish food. In any case, consuming Spanish food does not replace 100% the food of origin. In fact, 29.2% of the participants answered that more than three-quarters of their diet was based on food from their country of origin. These numbers would be even higher among Chinese immigrants considering the interviews:

(P-95, woman, 40 years, Chinese): "We like Spanish food as if you liked Chinese food. However, you cannot eat Spanish food every day. Your stomach will not let you".

(P-36, man, 37 years, Chinese): "We can go to a Spanish restaurant one day and eat tapas, but not every day...".

The results show that the Chinese immigrant population consumes more food from the country of origin than Africans and South Americans. On the one hand, Chinese food differs more from Spanish food compared to other immigrant groups:

(P-5, man, 35 years, Chinese): "Food is totally Chinese from the beginning of the day. We usually have boiled rice or noodles soup for breakfast"

(P-121, woman, 25 years, Chinese): "Huo guo is very traditional, especially in winter. It is like a pan on the fire where we put everything: meat, meatballs, and vegetables. Everything is boiled; we put sauce on it, sometimes spicy".

On the other hand, there is a connection between food and traditional Chinese medicine practiced by this community, so it allows them to maintain their ethnic identity:

(P-115, man, 40 years, Chinese): 'We identify foods with elements of Traditional Chinese Medicine, classify them in different ways and use them to restore internal balance'.

Another section of the survey focused on knowing the place where immigrants had the main meals of the day. Most of them had breakfast (85.4%), lunch (84.2%) and dinner (89.6%) at home/other place of residence, despite the fact that most Asians mostly so at the workplace. The intense working hours among Chinese immigrants altered the eating pattern:

(P-63, woman, 22 years, Chinese): "...sometimes we don't have breakfast because we go to the store quickly".

(P-128, woman, 32 years, Chinese: '... Chinese are seen eating inside stores or stumbling on the door of the store; they are working and cannot close the business to eat'.
(P-6, man, 39 years, Chinese): "I can only eat if we take turns at work, because the store cannot be left alone at any time".

(P-63, woman, 22 years, Chinese): "I usually have a Spanish breakfast, milk with cereals, since I work very early, and I don't have time to prepare a real Chinese breakfast".

Sex differences were not significant for most variables except for the consumption of eggs, sausages, juices, soft drinks, herbal infusions, and beer and when drinking alcohol and shopping food they considered tasty. Women consumed fewer eggs ($p<0.001$), sausages ($p=0.03$), soft drinks ($p=0.003$) and beer ($p=0.01$) than men and more juices ($p=0.005$) and herbal infusions ($p=0.02$) (**Table II**).

Table II: Unifactorial analysis. Differences in food consumption according to sex.

Variable	n	Categories	Men n (%)	Women n (%)	p-value*
Egg consumption	234	Daily 1-3 or more per week < 1 per week	23 (54.8%) 39 (25,2%) 14 (37,8%)	19 (45.2%) 116 (74,8%) 23 (62.2%)	0.001
Sausages consumption	192	Daily 1-3 or more per week <1 per week to never	8 (57.1%) 31 (37.3%) 24 (25.3%)	6 (42.9%) 52 (62.7%) 71 (74.7%)	0.03
Soft Drink consumption	197	Daily 1-3 or more per week <1 per week to never	17 (48.6%) 29 (42%) 20 (21.5%)	18 (51.4%) 40 (58%) 73 (78.5%)	0.003
Herbal infusion consumption	210	Daily 1-3 or more per week <1 per week to never	11 (16.9%) 23 (37.7%) 29 (34.5%)	54 (83.1%) 38 (62.3%) 55 (65.5%)	0.02
Beer	94	Daily 1-3 or more per week Per month several to less than 1	10 (90.9%) 14 (42.4%) 21 (42%)	1 (9.1%) 19 (57.6%) 29 (58%)	0.01
Juice consumption	210	Daily 1-3 or more per week <1 per week to never	11 (16.2%) 24 (38.1%) 29 (38.7%)	57 (83.8%) 39 (61.9%) 46 (61.3%)	0.005

**Only variables that reached significance are shown. *Own elaboration*

Unifactorial inferential analysis

Table III shows the differences between place of origin and the other variables. Asians had higher percentages for residence time in Spain and for source of income from work. They also had higher values for the percentage of eating food from their country of origin ($p<0.001$).

High statistical significance was observed in the relationship between the origin of the respondents and some diseases.

There were high percentages of hypercholesterolemia in respondents from South America (95.5%, $p<0.001$), and a high prevalence of bone problems among participants of Asian origin (38.2%, $p<0.001$).

In terms of consumption, oil consumption is highly significant ($p<0.001$), with higher percentages of daily consumption among Africans and Latinos:

(P-20, women, 49 years, Chilean: '... when I arrived in Spain, I changed my eating habits because I began to cook more and end up cooking different things, high in fat'.

Statistically significant differences (p<0.001) were also found in the consumption of milk and dairy products according to origin, where Africans reach the highest percentages and Asians the lowest.

In terms of not taking food for beliefs, Africans have higher percentages in general, as well as in terms of not buying for tastiness or buying for vitamins and health, together with Latinos. When shopping by price, Africans and Asians had higher percentages than Latinos (p<0.001).

Brand shopping was not as important for Latinos and Asians as for Africans (p=0.044).

The main differences in alcohol consumption were found among Africans, where the majority were non-drinkers, whose main reason was beliefs, compared to Asians who were drinkers and where daily consumption of beer, wine, champagne and mixed drinks reached high percentages. Length stay of residence in Spain and alcohol consumption by sex were also compared, giving rise to a higher percentage of female drinkers the longer they have been in Spain (54.2%, p<0.001).

In terms of where they ate their meals, Asians mostly ate at the workplace, whether for breakfast, lunch, or dinner.

Table III: Unifactorial analysis. Differences by place of origin.

Variable	n	Categories	Africa (n=60) M (SD) or n (%)	South America (n=140) M (SD) or n (%)	Asia (n=40) M (SD) or n (%)	p-Value
Age	234		32.02 (8.08)	37.04 (11.16)	32.5 (7.76)	0.005
Months in Spain	235	Up to 1 year 1 to 6 years More than 6 years	13 (15.3%) 20 (34.5%) 27 (29.3%)	69 (81.2%) 33 (56.9%) 33 (35.9%)	3 (3.5%) 5 (8.6%) 32 (34.8%)	<0.001
Income	207	By work For benefits or aids No source	10 (12.5%) 12 (24%) 26 (33.8%)	34 (42.5%) 38 (76%) 48 (62.3%)	36 (45%) 0(0%) 3 (3.9%)	<0.001
Type of diet	236	Omnivorous Omnivorous according to beliefs Vegetarian Other	32 (17.7%) 21 (53.8%) 5 (41.7%) 0 (0%)	114 (63%) 14 (35.9%) 7 (58.3%) 4 (100%)	35 (19.3%) 4 (10.3%) 0 (0%) 0 (0%)	<0.001
Percentage of food of origin	200	<=25% 26 to 50% 51 to 75% >76%	7 (14%) 15 (32.6%) 10 (29.4%) 17 (24.3%)	40 (80%) 30 (65.2%) 12 (35.3%) 31 (44.3%)	3 (6%) 1 (2.2%) 12 (31.4%) 38 (19%)	<0.001

Diseases	239	Cholesterol Yes
		              No
		Bone problems Yes
		              No
			1 (4.5%)
			59 (27.2%)
			1 (2.9%)
			59 (28.8%)
				21 (95.5%)
				118 (54.4%)
				20 (58.8%)
				119 (58%)
					0 (0%)
					40 (18.4%)
					13 (38.2%)
					27 (13.2%)
						<0.001
						
						<0.001

Breakfast place	239	Home/place where I live Bars Work I don't make this meal	59 (28.8%) 1 (9.1%) 0 (0%) 0 (0%)	116 (56.6%) 9 (81.8%) 7 (43.8%) 7 (100%)	30 (14.6%) 1 (9.1%) 9 (56.3%) 0 (0%)	<0.001
Lunch place	238	Home/place where I live Bars Work	55 (27.2%) 5 (35.7%) 0 (0%)	126 (62.4%) 7 (50%) 5 (22.7%)	21 (10.4%) 2 (14.3%) 17 (77.3%)	<0.001
Dinner place	237	Home/place where I live Bars Work I don't make this meal	60 (27.9%) 0 (0%) 0 (0%) 0 (0%)	121 (56.3%) 8 (88.9%) 4 (44.4%) 4 (100%)	34 (15.8%) 1 (11.1%) 5 (55.6%) 0 (0%)	0.01
Fish consumption	224	Daily 1-3 or more per week <1 per week to never	10 (38.5%) 35 (28.5%) 12 (16%)	10 (38.5%) 65 (52.8%) 53 (70.7%)	6 (23.1%) 23 (18.7%) 10 (13.3%)	0.028
Egg consumption	234	Daily 1-3 or more per week <1 per week to never	9 (21.4%) 42 (27.1%) 8 (21.6%)	20 (47.6%) 90 (58.1%) 26 (70.3%)	13 (31%) 23 (14.8%) 3 (8.1%)	0.051
Pasta, rice and potatoes consumption	214	Daily 1-3 or more per week <1 per week to never	17 (27%) 37 (26.2%) 2 (20%)	40 (63.5%) 70 (49.6%) 8 (80%)	6 (9.5%) 141 (100%) 0 (0%)	0.042
Bread and cereals consumption	204	Daily 1-3 or more per week <1 per week to never	43 (33.1%) 8 (11.9%) 1 (14.3%)	68 (52.3%) 40 (59.7%) 4 (57.1%)	19 (14.6%) 19 (28.4%) 2 (28.6%)	0.005
Oil consumption	211	Daily 1-3 or more per week <1 per week to never	42 (34.1%) 12 (20.3%) 3 (10.3%)	74 (60.2%) 26 (44.1%) 15 (51.7%)	7 (5.7%) 21 (35.6%) 11 (37.9%)	<0.001

Variable	n	Categories		Africa (n=60) M (SD) or n (%)	South America (n=140) M (SD) or n (%)	Asia (n=40) M (SD) or n (%)	p-Value
Butter consumption	193	Daily		8 (17.8%)	26 (57.8%)	11 (24.4%)	0.031
		1-3 or more per week		22 (27.8%)	36 (45.6%)	21 (26.6%)	
		<1 per week to never		24 (34.8%)	39 (56.5%)	6 (8.7%)	
Vegetables consumption	212	Daily		27 (34.2%)	45 (57%)	7 (8.9%)	0.024
		1-3 or more per week		28 (24.6%)	61 (53.5%)	25 (21.9%)	
		<1 per week to never		3 (15.8%)	9 (47.4%)	7 (36.8%)	
Legumes consumption	202	Daily		6 (13%)	33 (71.7%)	7 (15.2%)	<0.001
		1-3 or more per week		38 (33.9%)	60 (53.6%)	14 (12.5%)	
		<1 per week to never		7 (15.9%)	19 (43.2%)	18 (40.9%)	
Dairy products consumption	214	Daily		32 (39%)	45 (54.9%)	5 (6.1%)	<0.001
		1-3 or more per week		26 (26%)	55 (55%)	19 (19%)	
		<1 per week to never		1 (3.1%)	18 (56.3%)	13 (40.6%)	
Milk consumption	210	Daily		46 (37.4%)	67 (54.5%)	10 (8.1%)	<0.001
		1-3 or more per week		9 (15.5%)	29 (50%)	20 (34.5%)	
		<1 per week to never		3 (10.3%)	16 (55.2%)	10 (34.5%)	
Juice consumption	206	Daily		25 (36.8%)	40 (58.8%)	3 (4.4%)	0.002
		1-3 or more per week		21 (33.3%)	28 (44.4%)	14 (22.2%)	
		<1 per week to never		12 (16%)	46 (61.3%)	17 (22.7%)	
Herbal infusion consumption	210	Daily		24 (36.9%)	36 (55.4%)	5 (7.7%)	0.044
		1-3 or more per week		13 (21.3%)	33 (54.1%)	15 (24.6%)	
		<1 per week to never		19 (22.6%)	46 (54.8%)	19 (22.6%)	
Coffee consumption	213	Daily		22 (27.2%)	55 (67.9%)	4 (4.9%)	<0.001
		1-3 or more per week		14 (29.2%)	25 (52.21%)	9 (18.8%)	
		<1 per week to never		23 (27.4%)	35 (41.7%)	26 (31%)	
Chocolate consumption	203	Daily		14 (56%)	10 (10%)	1 (4%)	0.012
		1-3 or more per week		18 (21.4%)	47 (56%)	19 (22.6%)	
		<1 per week to never		22 (23.4%)	53 (56.4%)	19 (20.2%)	
Products not consumed by beliefs	188		Yes	29 (58%)	18 (36%)	3 (6%)	<0.001
			No	23 (16.7%)	79 (57.2%)	36 (26.1%)	
No alcohol by befiefs	75		Yes	25 (80.6%)	3 (9.7%)	3 (9.7%)	<0.001
			No	19 (43.2%)	24 (54.5%)	1 (2.3%)	
No pig by beliefs	74		Si	25 (78.1%)	5 (15.6%)	2 (6.3%)	0.009
			No	20 (47.6%)	20 (47.6%)	2 (4.8%)	
Purchase by	215	Tasty	Yes	19 (20.2%)	50 (53.2%)	25 (26.6%)	0.005
			No	35 (28.9%)	74 (61.2%)	12 (9.9%)	
		Vitamins	Yes	29 (27.1%)	73 (68.2%)	5 (4.7%)	<0.001
			No	25 (23.1%)	51 (47.2%)	32 (29.6%)	
		Healthy	Yes	35 (26.9%)	82 (63.1%)	13 (10%)	0.002
			No	19 (22.4%)	42 (49.4%)	24 (28.2%)	
		Price	Yes	24 (29.3%)	35 (42.7%)	23 (28%)	0.001
			No	30 (22.6%)	89 (66.9%)	14 (10.5%)	
		Brand	Yes	11 (47.8%)	9 (39.1%)	3 (13%)	0.044
			No	43 (22.4%)	115 (59.9%)	34 (17.7%)	
Drinks Alcohol	203		Yes	16 (18%)	48 (53.9%)	25 (28.1%)	0.001
			No	41 (36%)	60 (52.6%)	13 (11.4%)	
Reason not to drink alcohol	109	I don't like it		15 (20.5%)	48 (65.8%)	10 (13.7%)	<0.001
		Beliefs		26 (72.2%)	7 (19.4%)	3 (8.3%)	
Beer	94	Daiy		2 (18.2%)	3 (27.3%)	6 (54.5%)	0.003
		1-3 or more per week		9 (27.3%)	20 (60.6%)	4 (12.1%)	
		Per month several to less than 1		5 (10%)	39 (78%)	6 (12%)	
Wine/Champagne	75	Daiy		2 (50%)	0 (0%)	2 (50%)	0.017
		1-3 or more per week		6 (25%)	13 (54.2%)	5 (20.8%)	
		Per month several to less than 1		6 (12.8%)	35 (74.5%)	6 (12.8%)	
Combined	72	Daiy		3 (42.9%)	1 (14.3%)	3 (42.9%)	<0.001
		1-3 or more per week		4 (28.6%)	2 (14.3%)	8 (57.1%)	
		Per month several to less than 1		7 (13.7%)	38 (74.5%)	6 (11.8%)	

Own elaboration

Table IV shows the relationship between the percentage of consumption of food from place of origin and time in Spain, place of origin, source of income and taste for Spanish food. No relationship was found between the percentage of consumption of food from place of origin and age, sex or perception of food in the last 12 months. It is observed that those who have been in Spain longer consume more food from their place of origin (Africans and mainly Asians), which is also related to the fact that they do not like Spanish food very much. In terms of income, those who have no source of income consume less food from their place of origin than those who have a job.

Table IV: Percentages of consumption of food of origin in relation to the time in Spain, place of origin, source of income and taste for Spanish food.

Variable	n	Categories	Percentage of consumption of food of origin				p-Value
			<=25% n (%)	25-50% n (%)	51-75% n (%)	>76% n (%)	
Time in Spain	197	Up to 1 year 1 to 6 years More than 6 years	29 (40.3%) 13 (28.9%) 7 (8.8%)	12 (16.7%) 11 (24.4%) 21 (26.3%)	11 (15.3%) 4 (8.9%) 19 (23.8%)	20 (27.8%) 17 (37.8%) 33 (41.3%)	<0.001
Origin	200	Africa South America Asia	7 (14.3%) 40 (35.4%) 3 (7.9%)	15 (30.6%) 30 (26.5%) 1 (2.6%)	10 (20.4%) 12 (10.6%) 12 (31.6%)	17 (34.7%) 31 (27.4%) 22 (57.9%)	<0.001
Income	180	By work For benefits or aids No source	15 (19.7%) 8 (19.5%) 26 (41.3%)	12 (15.8%) 15 (36.6%) 13 (20.6%)	14 (18.4%) 6 (14.6%) 10 (15.9%)	35 (46.1%) 12 (29.3%) 14 (22.2%)	0.001
Likes Spanish food	196	A lot/quite Regular Little or nothing I've never tried it	28 (30.4%) 14 (23%) 7 (17.5%) 0 (0%)	31 (33.7%) 9 (14.8%) 5 (12.5%) 0 (0%)	14 (15.2%) 11 (18%) 9 (22.5%) 0 (0%)	19 (20.7%) 27 (44.3%) 19 (47.5%) 3 (100%)	<0.001

Own elaboration

Multifactorial inferential analysis

The model obtained in the multiple correspondence analysis reached a Cronbach Alpha of 0.709 for the first dimension. Two dimensions explained 89.7% of the variability. In both dimensions, the discriminant measure values were higher for the origin variable (0.683 and 0.537, respectively). The variables time spent in Spain, source of income, and percentage of Spanish food reached values 0.574, 0.537 and 0.342 respectively for the first dimension and 0.316, 0.189 and 0.410 in the second. The mean of both dimensions, in descending order, yielded values of 0.610 for the place of origin, 0.445 for the time in Spain, 0.376 for the percentage of food sourced and 0.363 for the source of income.

Figure 1 shows the relationship between the categories of each variable. Dimension 1, which explains 70.95% of the variability, highlights the differences between Latinos versus Africans, with less differentiation, and Asians. Dimension 2, which explains 41.6% of the variability, shows the differences between African people versus Latinos and Asians.

Figure 1:
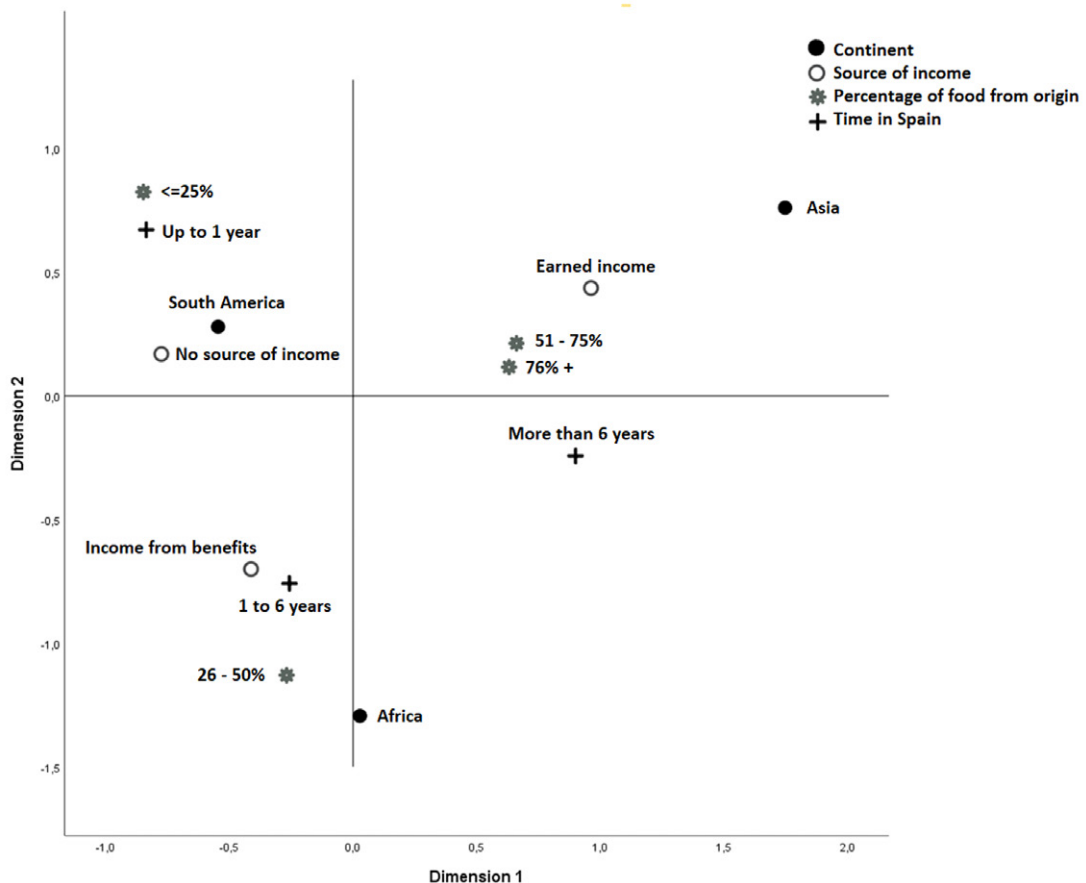
Asian immigrants are closer to income from work, have been in Spain for more than 6 years and consume percentages of food origin above 51%. Latinos are closer to having no income sources, spending less time in Spain, and consuming less food from the country of origin. Africans have more income from benefits, have been in Spain between 1 and 6 years, and the consumption of foods of origin is between 26 and 50%.

Discussion

Our findings showed that those immigrants living in Spain for a longer time tended to consume more Spanish food and that men consumed more alcohol. However, the most important differences were found when comparing the different subgroup of immigrants. Asian immigrants ate more in their workplaces and consumed more origin food and alcoholic beverages, Africans tended to consume less alcohol due to cultural beliefs and Latinos consumed more Spanish food and more fat foods.

Our first finding is related to the differences of food patterns between men and women. Previous surveys have shown that men are more consumers of alcohol[26], fatty products, and less fruit and vegetables than women[27] and this could be linked to the presence of health problems. While Muslim religion works as a protective factor for some African men, a high degree of acculturation of the Chinese population was related to higher consumption of alcohol[28]. The idea of drinking alcohol and smoking is common practice among the Chinese community in relation to leisure and social spaces, where they establish business relationships with their fellow citizens[15,29]. Other studies have attributed alcohol consumption to the fact that you have emigrated alone, which generates a feeling of loss of support network and social status, and disadvantaged living conditions[30,31], such as social isolation or work stress[32]. On the other hand, immigrant women play an important role in family food life and health, as they transfer acculturation phenomena and graft eating habits to members, including school age children, being protagonists of assimilation food culture (food modernity proposed by the youngest of family groups) or maintaining ethnic identity (forms learned in their first socialization in the country of origin)[33,34]. Although in many cases immigrant mothers retain traditional food preparation, children's preferences, time concerns, and availability of Arabic food led to changes in their daily food consumption[35].

Another factor that has influenced the eating habits was the length of stay in the country. Immigrants living longer in Spain tended to adopt more Spanish food. Indeed, several authors mention that dietary changes could be related to length of stay in the host country[36]. Popovic & Strasser[37] detected negative impacts of changes in eating habits among immigrants in the USA and Canada over time living in these countries, while in Europe the

relationship was not so clear. In fact, other authors found that a longer period of residence in Spain was associated with healthy and unhealthy changes in westernization of the diet among Latin American immigrants[38].

The country of origin was another important factor related to eating habits in our sample. Although the acculturation process can cause changes in eating patterns, both positive and negative[39], the inclusion of some typical Spanish products does not completely replace the original food or its cooking method. Our findings are supported by previous studies that have noted that African and Asian populations are the largest consumers of products from their place of origin as a means of affirming their cultural identity[40]. In our study, the assimilation of Spanish eating habits was lower among Chinese immigrants and the products used are more different from those of Spanish cuisine than in the case of African and Latin American immigrants. The Chinese population bases the diet on the consumption of plants in contrast to the Western diet, which is predominantly based on meats and dairy products, and enjoys great accessibility of food in supermarkets, shops, and restaurants managed by themselves[24]. On the other hand, there is a very strong ethnic identity bond, favored by considering food as a practice of traditional Chinese medicine to address health problems such as insulin resistance[41]. However, the results of previous studies also show that in recent decades the eating habits of Asians have undergone significant changes due to cultural assimilation of the youngest, interest in weight loss, and intense working hours[11,12,15].

Another difference among groups was concerning the restrictions of some foods. Some restrictions have obeyed Islamic-derived religious prescriptions, which reduces the consumption of alcohol or pork among some immigrants, mainly of African origin. These religious dietary restrictions have been identified as key sociocultural barriers to nutritious eating in Arabic-speaking immigrants and refugees[39].

Finally, our findings reveled that Latinos tended to eat more fat food. According to Delavari et al., (2013), adults migrating from low to high-income countries often engage in obesogenic behaviors and experience unhealthy weight gain for 10-15 years after migrating, with these rates approaching or exceeding that of the host population. Furthermore, the higher intake of fats and sugars may be due to the wide availability of fast-food restaurants as an economic solution for immigrants with fewer incomes[37,43]. Latinos in our study had lower income and tended to accept the Spanish food, which makes them more prone to change their diet and increase fat consumption. These unfavorable dietary changes can cause and complicate chronic diseases, including cardiovascular disease, hypertension, type 2 diabetes, and others[16], such as hypercholesterolemia which has a high percentage in the Latinos in our sample.

Limitations

This study has some limitations that should be highlighted. First, the cross-sectional study design does not allow establishing causal relationships. Second, despite using three different languages in our study, the language barrier may make it difficult for some community members to participate. Third, the convenience sampling used makes it difficult to make the sample representative of each of the group (community bias). Fourth, most participants were from a very vulnerable situation, searching from social and labor assistance. Therefore, it is difficult to infer the results to the global community to which they belong. However, our results were consistent with other studies. Future studies could include children and daughters of migrants, to analyze intergenerational differences, the influence of the acculturation process on family eating patterns, and the maintenance of the ethnic identity of the group.

Conclusions

In conclusion, the eating habits of immigrants living in Southern Spain can vary according to their sex, country of origin and length of residence. Government should be aware of the reasons for these diet patterns and which strategies could be used to mitigate eating problems.

Conflicts of interest

Authors have no conflicts of interest to disclose.

Authors' contribution (CRediT statements)

Bárbara Badanta: conceptualization, methodology, provision of resources (participants), investigation, writing - original draft, writing-reviewing and editing, supervision, and project administration; **Francisco Ballesteros Blaya:** provision of resources (participants), investigation, writing - original draft, **Domingo de-Pedro-Jimenez:** methodology, data curation, formal analysis and interpretation, writing - original draft, **Giancarlo Lucchetti:** formal analysis and data curation; writing-reviewing and editing; **Rocío de Diego-Cordero:** conceptualization, methodology, formal analysis and interpretation, writing-reviewing and editing, supervision.

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ORIGINAL

Comparison of Nerve Functions and Depression Level in Patients with Inferior Alvelor Nerve Laterilisation and Short Implant

Comparación de las funciones nerviosas y el nivel de depresión en pacientes con laterilización del nervio alvelor inferior e implante estándar

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Summary

Objective: Inferior alveolar nerve (IAN) lateralisation and short dental implant techniques used in implant surgery may have different effects on the nerve function and psychological status of patients. The aim of this study was to compare nerve function and depression levels in patients undergoing inferior alveolar nerve lateralisation and short implantation and to investigate the neurological and psychological effects of both methods.

Material and methods: Patients who visited the clinic of Marmara University Faculty of Dentistry with complaints of posterior mandibular tooth loss were included in the study. The test group consisted of patients who underwent IAN lateralization, while the control group comprised patients who received short dental implants without advanced surgical procedures. The study included 20 patients (10 IAN, 10 short dental implants), and their preoperative evaluations were conducted.

Results: The short implant procedure appears to provide better nerve function preservation compared to IAN lateralization based on the results of the two-point discrimination test, sharp-dull test, and brush stroke direction test. However, the Semmes-Weinstein monofilament test results did not show a significant difference. Our study found that the mean Beck Depression Inventory score was similar both in patients with short dental implant and IAN lateralization.

Conclusion: Considering that similar results have been obtained with IAN lateralisation with short dental implants, it can be said that IAN lateralisation can be preferred for reasons such as bicortical anchorage that increases primary stability, which is very important in the process of osseointegration of the dental implant, lower risk of bone loss compared to short implants placed under similar conditions, long implant placement, crown-to-root ratio and thus contributing to implant biomechanics and prolonging implant survival.

Key words: Inferior Alveolar Nerve Lateralization, Short Dental Implant, Nerve Function, Depression.

Resumen

Objetivo: Las técnicas de lateralización del nervio alveolar inferior y de implante dental corto utilizadas en la cirugía de implantes pueden tener efectos diferentes sobre la función nerviosa y el estado psicológico de los pacientes. El objetivo de este estudio era comparar la función nerviosa y los niveles de depresión en pacientes sometidos a lateralización del nervio alveolar inferior y a implantes cortos e investigar los efectos neurológicos y psicológicos de ambos métodos.

Material y métodos: Se incluyeron en el estudio pacientes que acudieron a la clínica de la Facultad de Odontología de la Universidad de Mármara con quejas de pérdida de dientes mandibulares posteriores. El grupo de prueba estaba formado por pacientes sometidos a lateralización IAN, mientras que el grupo de control estaba formado por pacientes que recibieron implantes dentales cortos sin procedimientos quirúrgicos avanzados. El estudio incluyó a 20 pacientes (10 IAN, 10 implantes dentales cortos), y se realizaron sus evaluaciones preoperatorias.

Resultados: El procedimiento de implante corto parece proporcionar una mejor preservación de la función nerviosa en comparación con la lateralización IAN, basándose en los resultados de la prueba de discriminación de dos puntos, la prueba agudo-sordo y la prueba de dirección del trazo de pincel. Sin embargo, los resultados de la prueba del monofilamento de Semmes-Weinstein no mostraron diferencias significativas. Nuestro estudio halló que la puntuación media del Inventario de Depresión de Beck era similar tanto en pacientes con implante dental corto como con lateralización IAN.

Conclusiones: Teniendo en cuenta que se han obtenido resultados similares con la lateralización IAN con implantes dentales cortos, se puede decir que la lateralización IAN puede ser preferible por razones tales como el anclaje bicortical que aumenta la estabilidad primaria, muy importante en el proceso de osteointegración del implante dental, menor riesgo de pérdida ósea en comparación con los implantes cortos colocados en condiciones similares, colocación de implantes largos, relación corona-raíz y, por lo tanto, contribuyendo a la biomecánica del implante y prolongando la supervivencia del implante.

Palabras clave: Lateralización del nervio alveolar inferior, implante dental corto, función nerviosa, depresión.

Introduction

Although many techniques have been proposed for rehabilitation of the atrophic posterior mandible with dental implants[1], successful rehabilitation requires a minimum of 5 mm of usable bone above the IAN. In cases where the bone height above the IAN canal is less than 5 mm and the interarch distance is not sufficient to place onlay bone grafts, lateralisation of the nerve is the only option for rehabilitation of the mandibular posterior region with fixed prosthetic teeth[2,3].

The IAN procedure was first described by Alling[4]. This method is an effective and reliable technique for the rehabilitation of the over-resorbed mandibular posterior region with dental implants[5]. The IAN lateralisation technique allows short implant placement in the mandibular posterior region in cases with insufficient bone over the mandibular canal[6].

One of the advantages of this technique is that it allows for bicortical anchorage, which increases primary stability—a critical factor in the osseointegration process of dental implants[7]. Another advantage is that it carries a lower risk of bone loss compared to short implants placed under similar conditions[8]. The placement of longer implants contributes to the crown-to-root ratio and, consequently, to the biomechanics of the implant, extending its survival rate[9]. Numerous studies in the literature on this procedure have reported implant success rates ranging from 93.8% to 100%[3,10,11]. With this high success rate, patient satisfaction is also significantly high[3].

As with all techniques applied in oral implantology, the IAN lateralization technique is not free from complications, and neurosensory disturbances are the most frequently reported complication[1]. In these cases, nearly all patients experience temporary neurosensory impairments in the early stages. However, these changes are temporary in the vast majority of cases. Systematic reviews and meta-analyses have reported that the likelihood of permanent nerve damage (lasting over six months) is less than 1%[2]. Considering technological advancements related to osteotomy techniques and the use of biomaterials, IAN lateralization offers benefits to both the patient and clinician as a treatment option with low morbidity and high predictability[12]. To reduce morbidity associated with the procedure, various modifications have been proposed to date[12-14]. In particular, the use of piezo-surgery devices in this technique has significantly reduced the risk of potential permanent nerve damage[3].

The aim of this study is to compare nerve functions and depression levels in patients who have undergone IAN lateralization with those who have received short dental implant procedures.

Methods

Research Group
This study aimed to evaluate various functional and psychological parameters of patients who underwent IAN lateralization. The test group consisted of patients who underwent IAN lateralization, while the control group comprised patients who received short dental implants without advanced surgical procedures. The study included 20 patients (10 IAN, 10 short dental implants), and their preoperative evaluations were conducted. These patients were re-examined in the 1st week, 1st month, 2nd month, and 3rd month post-surgery. Care was taken to ensure that the gender distribution was similar between the groups. The ratio of men to women was the same in both the short implant and IAN groups. The flowchart of patients selection was given in **figure 1**.

Figure 1: Flow chart of patients selection.
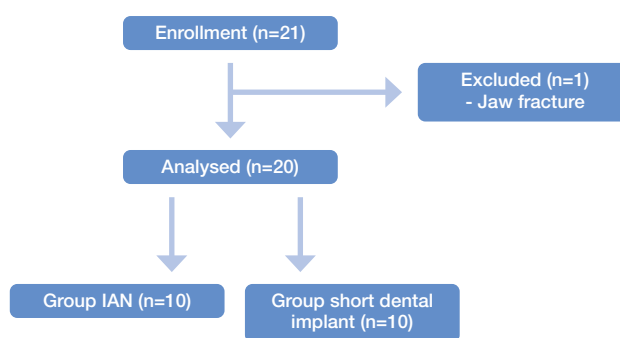
Inclusion criteria
Patients who visited the clinic of Marmara University Faculty of Dentistry with complaints of posterior mandibular tooth loss were included in the study.

Exclusion criteria
The presence of additional jaw-related conditions, such as jaw fractures, was considered an exclusion criterion. Patients who declined to participate in the study, as well as those with incomplete data, were excluded from the study.

Ethical approval
The ethics approval was obtained from the Marmara University Clinical Research Ethics Committee on December 12, 2022, under the approval number 09.2022.1616. Throughout the study, adherence to the Declaration of Helsinki was maintained. Written informed consent was obtained from all patients and/or their parents.

Sample size calculation and power analysis
Based on the sample sizes in our study, the effect size was calculated to ensure minimum statistical power. The sample size calculation was performed using the J-power module in Jamovi 2.4 software. A design with 10 participants per group will reliably detect effect sizes of

δ≥1.325 with a power greater than 0.8, assuming a two-sided test and a maximum Type I error rate of α=0.05.

Data Collection

The following neurosensory tests were used for the evaluation of patients:

Two-Pointed Discrimination Test: This test allows for the measurement of simultaneous spatial boundaries and assesses the function of Aα fibers. The examination is conducted with calipers. Patients are asked to differentiate the number of contacts on the mucosa and skin while their eyes are closed. If the distance between the two points is less than 7mm, it is considered no change; between 7 and 11 mm, it is considered a slight change; greater than 11 mm is classified as impaired sensitivity. This is a non-invasive test.

Pointed-Blunt Discrimination Test: This test provides a semi-quantitative assessment of pain and touch sensitivity. The examination is performed using a dental probe and a cotton applicator. The cotton is lightly touched to the skin surface and oral mucosa. Mechanoreceptors (Aα fibers) and nociceptors (Aδ and C fibers) are evaluated. This is a non-invasive test.

Semmes Weinstein Monofilament Test: The primary purpose of this test is to assess the sense of touch. It is conducted using nylon monofilaments of approximately the same length (38 mm) but varying diameters. The diameter and length are used to control the applied force. While it is standardly used for monitoring diabetic polyneuropathy, it is also used to detect damage to the inferior alveolar nerve. Monofilaments are essentially "fishing lines" with different thicknesses, usually expressed in specific colors. The thickness of the line is increased until the patient feels the filament. The point at which the patient perceives the filament is recorded as the threshold value. This is a non-invasive test.

Brush Stroke Direction Discrimination Test: In this test, brush strokes are applied to four quadrants of the patient's lip, and the patient is asked to identify the direction of the stroke (left to right or right to left). This test is repeated 10 times, with 8 correct responses recorded as indicating sensitivity.

Depression Assessment

Beck Depression Inventory: The Beck Depression Inventory (BDI) is a self-report scale developed by Beck[15] in 1961 to measure emotional, cognitive, somatic, and motivational components. The BDI is one of the most commonly used self-report tools in research and clinical settings. While its primary purpose is to comprehensively assess depression symptoms, it also allows for the evaluation of cognitive content. The scale consists of 21 items, with two items assessing emotions, eleven items assessing cognition, two items assessing behavior, five items assessing physical symptoms, and one item

assessing interpersonal symptoms. The 21-question questionnaire was used in the evaluation of the BDI. Patients were asked to select the most appropriate response for their condition. Each question was scored from 0 to 3, resulting in scores ranging from 0 to 63.

Statistical Analysis

The analysis of the data obtained from our study was performed using SPSS 21.0. Mean±standard deviation and percentage distributions were provided as descriptive statistics. For comparisons of parametric quantitative data, the independent sample t-test was used, while for comparisons of non-parametric quantitative data, the Mann-Whitney U test was applied. The chi-square test was used to examine the relationship between categorical variables. A p-value of less than 0.05 was considered statistically significant.

Results

In the study, there were 10 patients in each group (Short Implant and IAN). The average age was 53.80±7.14 in the Short Implant group and 49.50±6.99 in the IAN group. Both groups had 40% female and 60% male participants. Most patients were married, and educational levels varied between high school and postgraduate. Employment rates were higher in the Short Implant group (70%) compared to the IAN group (50%). Three patients in the Short Implant group were smokers, while none in the IAN group smoked. Intraoperative hemorrhage and edema occurred only in the Short Implant group (10%) (**Table I**).

When comparing the results of the two-pointed discrimination test in patients who underwent short dental implants and IAN lateralization, there was a significant difference between the groups in the 1st week and 1st month measurements (**Table II**).

It was observed that the recovery in nerve function in patients with dental implants was faster after the first week, and there was no significant difference between the two methods in terms of nerve function after the 2nd month. The two-point discrimination test evaluates nerve functions in the skin or mucosa, so this difference may indicate that short dental implants have a more positive effect on nerve function or that there may be less pressure on the nerve.

When comparing the results of the pointed-blunt discrimination test in patients who underwent short dental implants and IAN lateralization, there was a significant difference between the groups in the 1st week and 1st month measurements. The proportion of positive results in the 1st week and 1st month measurements was significantly higher in patients who underwent short dental implants compared to those who underwent IAN lateralization (p<0.05) (**Table III**). The pointed-blunt discrimination test evaluates the

ability of tissues to differentiate between pointed and blunt points, serving as an indicator of nerve function. In patients who underwent short dental implants, the proportion of positive results in both measurements was significantly higher compared to those who underwent IAN lateralization. This suggests that short dental implants may better preserve nerve function or that the pressure on the nerve may be lower.

When comparing the results of the Semmes-Weinstein Monofilament test between patients with short dental implants and those with IAN lateralization, it was found that the values for the Semmes-Weinstein Monofilament test were higher in the 1st week and 1st month measurements and lower in the 3rd measurement for patients with IAN lateralization. However, there was no significant difference between the groups (p>0.05) (**Table IV**). The Semmes-Weinstein Monofilament test assesses touch sensitivity and nerve function. These results indicate that neither treatment caused a significant difference in touch sensitivity and nerve function.

When comparing the results of the brush stroke direction test between patients with short dental implants and those with IAN lateralization, it was found that there was a significant difference in the 1st week and 1st month measurements results. The proportion of positive results in the 1st week and 1st month measurements was significantly higher in patients with short dental implants compared to those with IAN lateralization (p<0.05) (**Table V**). The brush stroke direction test is used to assess sensitivity to light touch and nerve function in the skin or mucous membranes. This finding may suggest that the short dental implant procedure yields better results in terms of nerve function compared to the IAN procedure. Specifically, the higher number of positive results in the brush stroke direction test could indicate that patients retain their sense of touch better or that their nerve functions are less affected.

There was no significant difference in depression level between patients with short dental implant and IAN lateralisation (p>0.05) (**Table VI**).

Table I: Demographic properties of the patients.

	Short Implant (n=10)	IAN (n=10)
Age (X̄±SD)	53.80±7.14	49.50±6.99
Gender- n (%)		
Female	4 (40)	4 (40)
Male	6 (60)	6 (60)
Marital Status- n(%)		
Married	8 (80)	9 (90)
Single	2 (20)	1 (10)
Education-n (%)		
Primary School	1 (10)	1 (10)
Secondary School	0 (0)	1 (10)
High School	3 (30)	4 (40)
Associate/Bachelor's Degree	3 (30)	4 (40)
Postgraduate	3 (30)	0 (0)
Employment Status -n (%)		
Not working	3 (30)	5 (50)
Working	7 (70)	5 (50)
Number of Implants (X̄±SD)2.10±.31	2.00±.47	
Systemic Anamnesis-n (%)		
No	9 (90)	9 (90)
Yes	1 (10)	1 (10)
Chronic Disease-n (%)		
Yes	1 (10)	2 (20)
No	9 (90)	8 (80)
Continuously Used Drugs -n (%)		
Yes	1 (10)	1 (10)
No	9 (90)	9 (90)
Cigarette-n (%)		
Yes	3 (30)	0 (0)
No	7 (70)	10 (100)
Alcohol-n (%)		
Yes	1 (10)	0 (0)
No	9 (90)	10 (100)
Intraoperative Haemorrhage -n (%)		
Yes	1 (10)	0 (0)
No	9 (90)	10 (100)
Edema-n (%)		
Yes	1 (10)	0 (0)
No	9 (90)	10 (100)

SD: Standart deviation, IAN: Inferior alveolar nerve

Table II: Comparison of the two-pointed discrimination test measurement results according to the research group.

	Short Implant		IAN		X^2	p
	Positive n (%)	Negative n (%)	Positive n (%)	Negative n (%)		
Two Pointed Discrimination Test 1st Week	8 (80.0)	2 (20.0)	2 (20.0)	8 (80.0)	7.200	.007
Two Pointed Discrimination Test 1st Month	8 (80.0)	2 (20.0)	3 (30.0)	7 (70.0)	5.051	.025
Two Pointed Discrimination Test 2nd Month	9 (90.0)	1 (10.0)	9 (90.0)	1 (10.0)	.000	1.000
Two Pointed Discrimination Test 3th Month	10 (100.0)	0 (0.0)	10 (100.0)	0 (0.0)	-	-

IAN: Inferior alveolar nerve

Table III: Comparison of pointed-blunt test measurement results according to the research group.

	Short Implant		IAN		X^2	p
	Positive n (%)	Negative n (%)	Positive n (%)	Negative n (%)		
Pointed-Blunt Test 1st Week	8 (80.0)	2 (20.0)	3 (30.0)	7 (70.0)	5.051	.025
Pointed-Blunt Test 1st Month	8 (80.0)	2 (20.0)	3 (30.0)	7 (70.0)	5.051	.025
Pointed-Blunt Test 2nd Month	9 (90.0)	1 (10.0)	9 (90.0)	1 (10.0)	.000	1.000
Pointed-Blunt Test 3th Month	10 (100.0)	0 (0.0)	10 (100.0)	0 (0.0)	-	-

IAN: Inferior alveolar nerve

Table IV: Comparison of Semmes-Weinstein Monofilament Test Results by Study Group.

	Short Implant		IAN			
	$\bar{X}$	SD (±)	$\bar{X}$	SD (±)	U	p
Semmens-Weinstein Monofilament Test 1st Week	60,00	126,48	150,00	158,10	35.000	.170
Semmens-Weinstein Monofilament Test 1st Month	9,00	25,14	55,00	64,30	31.000	.092
Semmens-Weinstein Monofilament Test 2nd Month	.525	,20	,32	,66	32.000	.093
Semmens-Weinstein Monofilament Test 3th Month	,01	,01	,01	,01	46.000	.689

IAN: Inferior alveolar nerve

Table V: Comparison of Brush Stroke Direction Test Measurement Results by Study Group.

	Short Implant		IAN		X^2	p
	Positive n (%)	Negative n (%)	Positive n (%)	Negative n (%)		
Brush Stroke Direction Test 1st Week	8 (80.0)	2 (20.0)	3 (30.0)	7 (70.0)	5.051	.025
Brush Stroke Direction Test 1st Month	8 (80.0)	2 (20.0)	3 (30.0)	7 (70.0)	5.051	.025
Brush Stroke Direction Test 2nd Month	9 (90.0)	1 (10.0)	10 (100.0)	0 (0.0)	1.053	.305
Brush Stroke Direction Test 3th Month	10 (100.0)	0 (0.0)	10 (100.0)	0 (0.0)	-	-

IAN: Inferior alveolar nerve

Table VI: Comparison of Depression Levels by Study Group.

	Group	n	$\bar{X}$	SD (±)	t	p
Beck Depression Inventory	Short Implant	10	3,80	,91	-1.134	.272
	IAN	10	4,20	,63		

IAN: Inferior alveolar nerve

Discussion

When a person loses a tooth, the supporting bone begins to shrink. This situation creates challenges in treatments involving posterior dental implants, as the required space is often limited due to nearby nerves and insufficient bone height and width[16]. For years, dentists have developed various methods to address this issue, such as using bone grafts from other parts of the body, bone expansion, or shorter implants. One innovative approach is to carefully reposition the nerve to create space for a longer implant.

Introduced in the 1980s, this technique is known as nerve lateralization. Although it carries some risks, lateralization offers several advantages over other methods. It shortens the surgery time, reduces costs, and allows for the use of longer implants, which means more stable implants that are better anchored in the bone[17]. This method also helps in creating a stronger and more naturally looking dental prosthesis.

While there is some debate regarding the technique, particularly concerning success rates and potential complications, recent research has shown that the results are nearly on par with other methods. This suggests that nerve lateralization could be an effective solution when combined with implant placement[6,14]. However,

it is important to note that studies monitoring long-term patient outcomes are still quite limited, and some questions regarding the technique's lasting effectiveness remain unanswered.

In dental implant treatments, significant aesthetic and functional benefits are provided to patients. However, surgical procedures near the nerve in the lower jaw can increase the risk of nerve damage, potentially leading to sensory loss as well as psychological distress and even depression. Although IAN lateralization was developed as a technique to protect the nerve, the full impact of this procedure on nerve functions and patients' mental health has not yet been fully clarified. Based on this, our study aimed to compare nerve functions and depression levels in patients who underwent IAN lateralization and those who received short dental implants, yielding important findings.

In the evaluation of nerve functions in the skin and mucous membranes using the two-point discrimination test, it was observed that the 1st week and 1st month measurements results were significantly better in the short dental implant group compared to the IAN lateralization group. While patients in the short dental implant group showed faster recovery, it can be said that the IAN lateralization procedure did not cause neurosensory dysfunction overall. When comparing the sharp-dull test results between patients with short dental implants and those with IAN lateralization, a significant difference was noted in the 1st week and 1st month measurements results, with the proportion of positive results being significantly higher in patients with short dental implants compared to those with IAN lateralization. The sharp-dull test evaluates the ability to distinguish between sharp and blunt stimuli and may indicate nerve function[16]. The higher proportion of positive results in both measurements for the short dental implant group suggests that short dental implants may better preserve nerve function or exert less pressure on the nerve. A randomized clinical study by Garoushi et al[18] evaluating the effects of IAN lateralization and bone grafting on nerve function and implant stability reported that although patients with IAN lateralization healed faster, there was no statistically significant difference between the two groups at any time interval, indicating that IAN membrane isolation did not reduce neurosensory dysfunction (NSD). This contradicts the hypothesis proposed by Kahnberg et al[19] that an inserted collagen membrane increasing the distance between the IAN and the underlying implants would improve nerve function post-surgery.

When comparing the results of the Semmes-Weinstein Monofilament test between short dental implants and IAN lateralization, although the values for the Semmes-Weinstein Monofilament test were higher in the 1st week and 1st month measurements and lower in the 2nd month measurement for patients with IAN lateralization, no significant difference was found between the groups. The Semmes-Weinstein Monofilament test is used to evaluate touch sensitivity and nerve function. These results indicate that neither procedure caused a significant difference in touch sensitivity and nerve function. We conducted an objective assessment of neurosensory disorders using Semmes-Weinstein monofilaments, which are calibrated individually to deliver the target force within a 5% standard deviation[20]. Rathod et al[20] reported that in a study examining changes in neurosensory function following IAN lateralization for implant placement, the number of patients with neurosensory disorders was 10 (100%) at the end of the 1st month, 9 at 2 months, 8 at 3 months, and only 2 by the 4th month. Monnazzi et al[21] conducted a study comparing the sharp-dull sensitivity in patients undergoing sagittal split ramus osteotomy (SSRO) on one side treated with a reciprocating saw and the other side treated with a piezoceramic device. The study found that all patients felt the first monofilament during the pre-surgery test and reported a change in sensitivity in at least one area assessed seven days post-surgery.

The brush stroke direction test, conducted to evaluate sensitivity to light touch and nerve function in the skin or mucous membranes, showed that the proportion of positive results in the 1st week and 1st month measurements was significantly higher in patients with short implants compared to those with IAN lateralization. This finding suggests that short dental implant procedures may yield better results in terms of nerve function compared to IAN lateralization. Specifically, the higher number of positive results in the brush stroke direction test could indicate that patients with short dental implants preserve their sense of touch better or experience less impact on nerve function.

Our study found that the mean Beck Depression Inventory score was similar both in patients with short dental implant and IAN lateralization. Implant treatment can often often cause fear, stress, anxiety, and depression among people[22,23]. The similarity of BDI scores between the two groups may indicate that the psychological effects of both treatment modalities on patients were similar. This may suggest that both procedures lead to similar levels of stress or anxiety.

Limitations

This study has several limitations. First, the small sample size (20 patients) limits the generalizability of the findings to a larger population. Second, the study's retrospective design may introduce biases, as it relies on previously recorded data. Third, the short follow-up period (3 months) may not be sufficient to capture long-term effects on nerve function and psychological outcomes. Additionally, factors such as smoking, alcohol consumption, and other lifestyle variables were not controlled, potentially influencing the results. Finally, the study focused only on nerve function and depression levels, without considering other possible patient outcomes, such as implant stability.

Conclusion

The findings of this study showed that nerve healing times were shorter in patients with dental implants compared to patients with IAN lateralisation. No significant difference in nerve function was observed between the two groups, especially after 3 months. In addition, the similar depression levels between both groups suggest that the treatment processes are comparable in terms of psychological effects. The similar psychological status of patients undergoing both short dental implant and IAN lateralisation suggests that both treatment modalities create similar levels of stress on patients.

Given that short dental implants and IAN lateralization have shown similar outcomes, IAN lateralization might be preferred for a few compelling reasons. First, it allows for bicortical anchorage, which boosts the primary stability of the implant—crucial for ensuring successful osseointegration. Additionally, this approach tends to result in less bone loss compared to short implants placed in similar conditions. By enabling the placement of longer implants, it also enhances the crown-to-root ratio, supporting better biomechanics. Ultimately, these factors work together to prolong the implant's lifespan, making IAN lateralization a strong choice in many cases.

Conflict of interest

The authors declare that there is no conflict of interest.

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ORIGINAL

Beyond the acute phase of COVID-19: health experiences from patients with long COVID. A Systematic Review

Más allá de la fase aguda de COVID-19: experiencias de salud de pacientes con COVID persistente. Una revisión sistemática

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Abstract

Aim: This study aimed to investigate the health experiences of patients with long COVID.
Methods: A systematic review was carried out between June and July 2022 using PubMed, CINAHL, PsycINFO, Scopus and Web of Science databases. A quality assessment of the selected articles was performed.
Results: A total of 29 articles were included in this review. On the one hand, the persistence of symptoms of COVID-19 affected the physical capacity to carry out activities of daily living, and affected as well mental health, mainly due to anxiety, depression and post-traumatic illness derived from fear of contagion, death or hopelessness for symptoms that do not disappear. On the other one, social, and occupational deterioration was also found, and patients felt a depersonalized attention and little credibility by health professionals and health services.
Conclusion: Long COVID symptoms can adversely affect individuals physically, mentally, psychologically, and socially. Managers could plan programs to attend not only symptoms, but also basic and instrumental needs of the daily life of people after COVID-19, guaranteeing the strengthening of health and quality of life.

Key words: Health conditions, Long COVID, Post-acute COVID-19 syndrome, Public health.

Resumen

Objetivo: Este estudio tuvo como objetivo investigar las experiencias de salud de los pacientes con COVID persistente.
Métodos: Se realizó una revisión sistemática entre junio y julio de 2022 utilizando las bases de datos PubMed, CINAHL, PsycINFO, Scopus y Web of Science. Se realizó una evaluación de calidad de los artículos seleccionados.
Resultados: Un total de 29 artículos fueron incluidos en esta revisión. Por un lado, la persistencia de los síntomas de COVID-19 afectó la capacidad física para realizar las actividades de la vida diaria y también afectó la salud mental, principalmente por ansiedad, depresión y enfermedades postraumáticas derivadas del miedo al contagio, muerte o desesperanza por síntomas que no desaparecen. Por otro lado, también se encontró deterioro social y laboral, y los pacientes sintieron una atención despersonalizada y poca credibilidad por parte de los profesionales y servicios de salud.
Conclusión: Los síntomas prolongados de COVID pueden afectar negativamente a las personas física, mental, psicológica y socialmente. Los gestores podrían planificar programas para atender no sólo los síntomas, sino también las necesidades básicas e instrumentales de la vida diaria de las personas después del COVID-19, garantizando el fortalecimiento de la salud y la calidad de vida.

Palabras clave: Condiciones de salud, COVID persistente, Síndorme post-agudo de COVID-19, Salud pública.

Introduction

The COVID-19 pandemic has led to the death of over 6 million people worldwide[1,2]. Health systems have faced many challenges, such as the need to control the transmission of coronavirus, the need for infrastructures to care for the population affected by this virus, and the need to maintain health coverage for patients with other pathologies, such as chronic diseases[3].

Although most individuals who suffer COVID-19 return to their pre-COVID-19 baseline state within several weeks, it is estimated that about 10-20% of people have persistent symptomatology for weeks or even months after recovery with cognitive, somatic, behavioural, and psychological symptoms, which can be disabling[4,5].

When people who have been infected and recovered present symptoms, generally within three months from the onset of COVID-19, or after recovery and maintained in the long term (at least two months), this is recognized as "*long COVID*"[6]. Knowing this prolongation of health deterioration is important since it must be noted that the long COVID is associated with repercussions not only in a physical way, but also in a psychological, social, and economic level. In addition, the fact that about 10-20% of people have persistent symptomatology[5], has led the long COVID to be included in the International Classification of Diseases System (ICD), highlighting the need to establish collaborative multidisciplinary care between primary care and hospital units[1,4].

Previous reviews show the predominant characteristics of the long COVID after hospital discharge[7,8]. They point to the risk of long-term sequela with cutaneous, respiratory, cardiovascular, musculoskeletal, mental health, neurologic, and renal involvement in those who survive the acute phase of the illness. Furthermore, some patients are unable to cope with daily life, especially if they also suffer significant social isolation and/or stigmatization, so it impacts on the quality of life[1,9]. However, the controversies in its definition impair proper recognition and management.

The World Health Organization has called countries to increase their efforts to systematically collect post-COVID-19 data and to prioritize therapeutic and rehabilitation development for those with long COVID[10]. From this point of view, it is necessary to know the needs and demands of patients affected by COVID-19 and their families, as well as the use and access to public resources to promote their quality of life, make adequate decisions and implement integrative care programs for people with physical and psychological sequelae and social and economic repercussions after the COVID-19 infection[11]. Therefore, the aim of this study is to analyse the health needs and conditions and health care provided to patients with persistent symptoms after infection with COVID-19. This includes experiences about health needs due to physical or psychological repercussions and also related to health care.

Methods

Design
A systematic review was carried out between June and July 2022, following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (PRISMA).

Databases and search strategy
Scientific databases (PubMed, CINAHL, Psycinfo, Scopus and Web of Science) were consulted for this review. The search strategy was ("*post covid**" OR "*long covid*" OR "*syndrome post covid*" OR "*covid survivors*") AND ("*health needs*" OR "*mental health*" OR "*health resources*" OR "*health services*"). In addition, a search in grey literature was also performed in the System for Information Grey Literature Europe (Open Grey) and the Grey Literature Report.

Inclusion and Exclusion Criteria for Selected Articles
To be included, articles should be original papers published during the first two years of the pandemic (2020-July 2022), with the following subject matter: patients with long COVID, studies focused on repercussions derived from the persistence, or that they analyse health needs or care provided by the health services to this population.

Because the coronavirus pandemic had global and recent repercussions, there were no restrictions on language nor year of publication. Articles were excluded if they were conference abstracts, case reports, editorials, letters to the editor, book chapters and other reviews. Studies focusing on patients with no COVID-19 disease (i.e., patients with chronic diseases during the pandemic) and patients in the acute phase of covid-19 were excluded, and those whose objective was to evaluate the effectiveness of pharmacological treatments.

Study selection and data extraction
Two researchers were responsible for extracting the data independently. The initial selection of articles was conducted by reading titles and abstracts. In this phase, articles potentially relevant based on the inclusion and exclusion criteria were selected, and duplicate publications were manually removed as well. In the second phase, the included articles were submitted to a full-text reading.
Finally, the data extracted for each study included authors, year, country, purpose of the study, research design, sample characteristics, and major findings (**Table I**).

Assessment of methodological quality
Methodological quality was assessed using tools that ensure the high quality of observational studies (e.g., Strengthening the Reporting of Observational studies in Epidemiology, STROBE), and qualitative studies (e.g., Standards for Reporting Qualitative Research, SRQR guidelines) to determine a sound methodology in the selected studies. Studies with a low score on the assessments performed by the investigators of this study were excluded.

Results

The search process identified 2099 publications matching the search criteria (**Figure 1**).

A total of 127 articles underwent full-text analysis. After reading the full text of the articles, the final sample included 29 studies.

Characteristics of the included studies

Twenty-nine articles in which the authors analysed the persistent symptoms of long COVID and the health care needs for these patients or attention provided to them were included. These studies were predominantly from the European continent (82.7%; n= 24), North America (10.3%; n=3) and Asia (6.9%; n=2).

More than half of the studies included in this review (58.6%; n=17) aimed to know the sequelae following COVID-19 infection affecting both physical and mental health, and 27.6% (n=8) to know the quality of life of patients with long COVID and their informal caregivers, their experiences, and limitations in their daily life. Finally, the aim of 13.8% (n=4) of the studies was to evaluate the different service models of caring for patients with long COVID for rehabilitation.

Regarding the sample, women were majority in 77.7% (n=21) of the studies. In general, the studies included patients with long COVID (65.5%; n = 15). In addition to these participants, other studies included healthcare professionals and family caregivers of patients with long COVID. Studies with follow-up of patients infected with covid-19 have ranged from 3 months of follow-up to 12 months, both in hospitalized and home patients.

Quality assessment

In assessing adherence to reporting guidelines, all included articles are of high or medium quality (in terms of adherence), ranging from 14.1 to 20.6 out of 22 in the Equator Guide for Observational Studies (Strengthening the Reporting of Observational Studies in Epidemiology).

After evaluation using the Guidelines on Standards for Reporting Qualitative Research, of the 8 studies selected all met quality characteristics, all fulfilling most of the items. The most frequent deficiencies detected were poor description of the interview scripts.

Theme 1. Extra deterioration in the quality of life

The studies analysed reflect the deterioration of physical health in people affected by COVID-19, beyond the acute phase of the disease. In fact, in a study conducted in Switzerland, 26% of the participants

Figure 1: Flowchart for the selection of articles for the review.
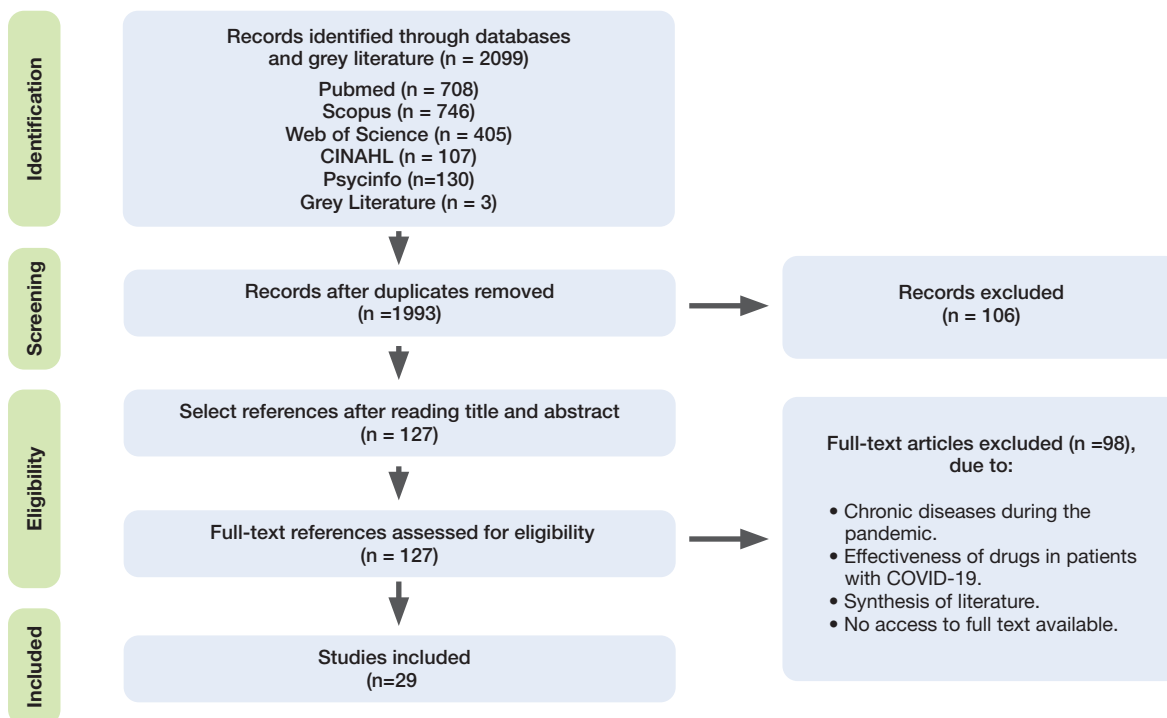
From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71. **For more information, visit** www.prisma-statement.org.

reported that they had not fully recovered between six and eight months after COVID-19 infection[12]. In other study conducted in Italy[13], the physical perceived health score was lower than expected in those of the general population after 3 months following COVID infection. Mirfazeli et al.[14] conducted a study in Iran, and they also showed that 90% of patients had at least one symptom of long COVID in their follow-up. This explains a health-related quality of life significantly more impaired in people with long COVID compared to general population[6,15]. Furthermore, patients with medical comorbidities prior to COVID infection, as it could be asthma, hypertension, sleep apnea, hypothyroidism, migraines, diabetes and/or hyperlipidaemia present an extra deterioration in the quality of life since these consequences of COVID can generate complications in their previous pathologies[16].

Respiratory problems and fatigue are found among the most persistent symptoms due to COVID-19[6,13,17-21]. Severe pulmonary lesions, low oxygen saturation and dyspnea in patients who have suffered from COVID-19 have stood out, especially among those patients who have had to be hospitalized for COVID-19[22] or due to other pathologies[23]. Forced vital capacity and diffusing capacity for carbon monoxide (DLCO) were significantly worse in patients with greater deterioration in perceived physical health, three months after acute infection[24].

Regarding the fatigue, in a study conducted in Brazil, authors reported that although there were no statistically significant differences, it was slightly more common as a new-onset symptom than as a persistent symptom[25], and Mirfazeli et al.[14] found no statistically significant relationship between the severity of COVID-19 in the acute phase and future chronic fatigue syndrome as a symptom of long COVID. In a study conducted in Turkey[26], the participants highlighted that the feeling of this fatigue they were experiencing had not been experienced before; it was a fatigue that did not pass by resting or sleeping and it was not related to physical work. It was a very strange feeling which limited them for the performance of daily life activities, therefore, it decreased their independence. For example, an alteration in physical activity, the capacity of mobility and a reduction of the distance travelled was observed[24]. However, many people resigned themselves and became accustomed to living with it[26].

Other persistent physical symptoms made patients to return to a health center (e.g., fever, dermatological problems, arrhythmias, and chest pain)[27]. Neurological disorders also persisted even 3 months after infection followed by new onset ones, resulting in altered sensation and loss of smell (perception of unpleasant odours or olfactory hallucinations), concentration problems, myalgia[6,14,16,25,28] and persistent headache, the latter being more frequent in women[27].

Regarding sex, Jiménez et al.[19] pointed to the female as

more favourable for the persistence of symptomatology in a study conducted in Spain. Rivera et al.[23], with a sample of 906 patients with long COVID in Spain, clarified that a higher frequency of persistent respiratory and systemic symptoms was evidenced in men and a higher prevalence of persistent mental health symptoms (especially anxiety and depression) in women.

Theme 2. Beyond the physical impact: mental health experiences derived from long COVID

The COVID-19 infection has generated a situation of uncertainty, anger, fear, frustration, and hopelessness. Furthermore, when someone has been infected by COVID-19 and has had to be hospitalized without maintaining contact with his/her family, the situation is more complicated due to the increasing levels of anxiety and depression[22,29].

It is noteworthy that the risk of developing mental disorders was two times higher in patients who continued with persistent symptoms after the infection[31], even after 6 months of follow-up[16,19,23,31,32]. In fact, a study conducted in Spain reported that patients experienced a deterioration of their psychological state and cognitive function, with a slight improvement at 6 - 7 months of follow-up, except for anxiety and depression, which increased[18]. Another study conducted in The Netherlands[32] showed that 3 months after the onset of COVID symptoms, 40% of the participants were at risk of suffering from post-traumatic stress disorder, however, at 6-month follow-up it decreased to almost 26%. Among the patients who were at risk for post-traumatic stress disorder at the 3- and 6-month follow-ups, two-thirds had clinically relevant symptoms of anxiety and depression[18,32].

It is also very common for patients who have passed COVID-19 to present some cognitive impairment, memory problems, sleep disorders and loss of concentration[16,20,32]. Rass et al.[28] showed that cognitive impairment was still evident at 3-month follow-up, and although at 1-year follow-up this impairment improved, it did not disappear definitively.

As consequences of this mental impact, some patients described how physical deterioration or a prolonged change in taste and smell prevented them from enjoying food, which limited the social activities of these people, such as going out to eat with friends or family, which may lead to cause emotional affectations[33]. In other cases, making social life was limited by increased dependence for activities of daily living, due to chronic fatigue[26]. For these reasons, although some patients returned gradually to work, others were on long-term sick leave, which had negative social and mental repercussions[15,34].

As part of the whole process, social support is considered essential, since the invisibility of this pathology or the lack of credibility of the symptoms by family and friends could deteriorate relationships with the social environment[35].

Theme 3.
Experiences searching for health resources

Many patients, after COVID infection, returned to the health services looking for treatment of persistent symptoms, so statistically significant increases in activity were identified in visits to the primary care doctor and nurse in patients with long COVID[35]. They also made use of emergency services and mental health care consultations, and some of them needed to be re-hospitalized[12]. To curb the collapse due to increased demand for health care, remote consultation began to be used. However, while some patients thought that regular follow-up by healthcare staff through telephone calls and a virtual support group would be helpful[20], other ones with more severe symptoms were concerned about the lack of a comprehensive assessment by health professionals using these methods[29].

In general, patients found difficult to access to healthcare services and noticed a variation in the quality of the therapeutic relationship. They reported late, non-existent, or inadequate responses due to the pressure suffered by the health service. Many young people without previous pathologies felt they were not treated quickly, as it was considered that COVID-19 and its symptoms were not so frequent or so severe in patients with this profile[37]. In this situation, patients turned to the Internet as a support element to solve many of their doubts regarding their health, to share similar experiences with other online users and to try diets, supplements and medications recommended by other people in the same situation[35,37]. However, in the results of Taylor et al.[38], participants expressed fear of somatising other people's symptoms when resorting to Internet support groups to share their experiences, which they described as an internal debate in which they did not know if the origin of their symptoms was their own or psychological.

Another aspect found in the analysed studies is the lack of credibility for the symptoms. Some patients in UK expressed their fear that certain symptoms would be perceived negatively by their primary care physician, therefore, they offered limited information about their symptoms to health personnel out of fear of their reaction[38]. All of this generated complications and critical events, uncertain prognosis, and physical and emotional discomfort because of organizing their own recovery plan[29,37]. In short, patients felt disenfranchised, overloaded with having to endure and manage persistent symptoms of long COVID, in addition to living with uncertainty and fear of whether full recovery is possible[35,37].

More details about the results are shown below, in **table I**.

Table I: Description of main results.

REFERENCE	OBJECTIVE	METHODS*	SAMPLE	MAJOR FINDINGS	METHODOLOGICAL QUALITY
Bilgin et al., 2021/ Turkey	To determine the perception of fatigue among patients who have recovered from COVID-19.	Qualitative (interviews)	N = 14 post-COVID-19 participants. Gender = 57.14% females. Age = 24-67 years.	Fatigue affected all patients who have passed COVID-19 increasing dependence in activities of daily living and hindering sociability. Some patients associated fatigue with the ongoing struggle with persistent COVID-19 symptoms, with not consuming enough food due to loss of appetite and other chronic pathologies. Other patients associated the main source of fatigue with uncertainty, the thought of getting the disease again, fear of death and negative news from the environment. Some strategies they employed to combat fatigue were including a diet rich in protein, vitamin supplements, infusions and vitamin C, activities to reduce psychological stress, such as going shopping or taking a walk. Patients emphasized that, as their fatigue did not disappear completely, they tried to live with it. They got used to it and resigned themselves to it.	SRQR
Burton et al., 2022/ United Kingdom (UK)	To analyse factors affecting mental health and well-being from the perspective of people with long COVID.	Qualitative (semi-structured interviews).	N = 21 participants who self-reported long COVID. Gender= 67% females. Age = 26–70 years (M = 47).	Long COVID caused disturbances in participants' daily life. The lack of service and treatment options led to worry, exacerbation of symptoms, continued uncertainty about the disease and lack of understanding of others, and consequently affected the ability to participate in enjoyable activities that might normally protect participants' well-being.	SRQR

REFERENCE	OBJECTIVE	METHODS*	SAMPLE	MAJOR FINDINGS	METHODOLOGICAL QUALITY
Chávez Sosa et al., 2022/ Peru	To determine the relationship between quality of life and depression in caregivers of post-covid-19 patients in two regions of Peru during the second wave of the pandemic.	Quantitative (questionnaires Modified Betty Ferell Quality of Life and the Beck Depression Inventory)	N = 730 caregivers Gender= 76.3% females. Age= 18-59 years	Among caregivers, 80.1% reported a poor quality of life when caring for their relatives, especially in psychological and spiritual well-being dimensions. Gender, age, place of origin, marital status, educational level, type of job, health insurance, COVID-19 vaccination, children, relationship with the patient, and depression were related to caregivers' quality of life. While being a male caregiver was associated with good quality of life, caregivers who had children, were vaccinated against COVID-19, were immediate family members, and had elevated depression were associated with poor quality of life.	STROBE (19.6/22)
Del Corral et al., 2022/ Spain	To investigate the health-related quality of life (HRQoL), symptoms, psychological and cognitive state and pulmonary and physical function of non-hospitalized COVID-19 patients at long-term.	Quantitative (cohort study): European Quality of Life - 5 Dimensions (EuroQol); Posttraumatic stress disorder checklist (PCL-C self-assessment); Hospital Anxiety and Depression Scale (HADS); the Montreal Cognitive Assessment (MoCA).	N = 102 non hospitalized COVID-19 patients Gender=62.74% females. Mean age= 46.6 years	An impaired health-related quality of life both at baseline and after follow-up was manifested by 60% of participants, mainly linked to mobility and pain/discomfort problems. Dyspnoea and muscle fatigue were the most frequent physical symptoms, however, at 6-7 months' follow-up participants expressed a slight improvement. Around 40-56% of the patients experienced a deterioration of their psychological state and cognitive function, with a slight improvement at 6-7 months, with the exception of anxiety/depression, which increased.	STROBE (19.6/22)
Duncan et al., 2021/ Scotland	To describe the community rehabilitation provision for people with long COVID in Scotland.	Mixed methods: A national electronic survey was developed, and the responses were analysed descriptively.	N = 14 Allied Health Professions Directors	Almost all Health Boards (13/14) offer rehabilitation for people with long COVID within pre-existing services and through a combination of face-to-face and digital contact. The main problems for which patients need rehabilitation are fatigue (11/14), respiratory disorders (9/14), musculoskeletal conditions (6/14), mental health (5/14) and neurological disorders (4/14). The main means of access to rehabilitation is through the hospital or primary care physician (13/14), self-referral (11/14) or interdisciplinary referrals (3/14). The provision of community rehabilitation services for people with long COVID is multidisciplinary. Almost all services (13/14) include occupational therapy and physical therapy. Many include dietetics (11/14) and speech therapy (9/14). Half include psychology support (7/14). In addition, three services reported that they could refer to, or have input from, different resources, such as post-intensive treatment nursing teams, therapeutic assistants, out-patient services for people with neurological conditions, spiritual care teams, and medical consultant services specializing in rehabilitation.	SRQR STROBE (14.9/22)
Ferrando et al., 2022/ USA	To describe neuropsychological, medical, psychiatric, and functional correlates of cognitive complaints experienced after recovery from acute COVID-19 infection.	Quantitative The Lawton-Brody Instrumental Activities of Daily Living Scale Instrumental Activities of Daily Living Scale (IADL); Chalder Fatigue Scale; Patient Health Questionnaire-9 (PHQ-9); Endicott Satisfaction and Enjoyment of Quality-of-Life Scale (Endicott QLESQ); The Post-Traumatic Stress Disorder Checklist (PTSD); Generalized Anxiety Disorder-7 questionnaire; The Premorbid Function Test; Patient Assessment of Own Function (PAOF); Neuropsychological Status Assessment (RBANS).	N = 60 participants Gender= 67% females Mean age= 41 years	The most frequent acute symptoms were fatigue (92%), respiratory symptoms (90%), neurological symptoms (87%), anosmia (67%) and memory/cognitive problems (57%). In addition, 27% had low scores on at least 1 neuropsychological test, and 53.33% with cognitive complaints scored lower than the general population with the same age range on tests of attention, processing speed, memory, and executive function. Finally, 53.33% also reported higher levels of depression, anxiety, fatigue, post-traumatic stress disorder, and functional difficulties, as well as lower quality of life.	STROBE (21/22)

REFERENCE	OBJECTIVE	METHODS*	SAMPLE	MAJOR FINDINGS	METHODOLOGICAL QUALITY
Giurgi-Oncu et al., 2021/ Romania	To analyse the severity of the acute COVID-19 and health impairments in subjects who are currently suffering from post-acute COVID-19; and, to explore the influence of hospital admissions on the mental health and wellbeing of these patients.	Quantitative study using transthoracic echocardiography (TTE); mental health examination; a quality-of-life questionnaire (QoL); a post-COVID-19 functional status scale (PCFS); a Hospital Anxiety and Depression scale (HADS) and VAS.	N = 143 participants with post-acute COVID-19 (64 inpatients and 79 outpatients) Gender=54.54% females Age= 18 – 55 years (M = 44.06).	There were statistically significant correlations between number of persistent symptoms and number of weeks since COVID-19 diagnosis, severity of lung injury, CRP levels during acute infection, and the number of hospital days. All inpatients had mild/moderate lung injury during acute COVID-19, in contrast to 37.97% of outpatients. Clinical depression and anxiety were present in 46.87% and 34.37% of inpatients and 27.84% and 40.5% of outpatients. The differences were only statistically significant for depression. Patients who were examined before 6 weeks since COVID-19 infection had more impaired activity levels, more pain/discomfort with worse VAS scores and reported higher levels of anxiety and depression.	STROBE (20.3/22)
Harenwall et al., 2021/ UK	To evaluate a 7-week virtual rehabilitation course ("Recovering from COVID" course) from a biopsychosocial approach to understanding COVID-19 and post-viral fatigue (PVF).	Pilot study EQ-5D-5L to assess health-related quality of life (HRQoL), VAS. Duration: 1h / session Themes: -Understanding COVID-19 and Viral Fatigue. -Sleep and how to improve it -Diet and the voice -Activity management -Movement and energy conservation -Stress management -Planning for the future	N = 149 participants (social, health, and care staff who are experiencing long COVID). Gender= 75% females. Mean age=47.25 years.	"Recovering from COVID" included relaxation, self-monitoring, action planning and problem solving, breathing and mindfulness techniques to activate the parasympathetic nervous system, and it focused on sleep optimization, nutrition, activity management, energy conservation, stress management, and breathing optimization. Evaluation of participant feedback showed that 96% of people felt more knowledgeable about their symptoms, 100% felt the exercises throughout the course were helpful. Analyses revealed a statistically significant effect of long COVID syndrome upon VAS scores (10%) at the post course assessment, but statistically significant effects were no observed between participants who completed the follow up and those that did not. At the post-course assessment 53.9% reported an improved health state, 7.9% had no change, 10.5% reported a worse health state, and 22.4% reported a mixed change in health state. Only 3% of participants returning to full health. Improvements of patients were not significantly predicted by age or symptom duration.	STROBE (21/22)
Houben-Wilke et al., 2022/ The Netherlands	To explore symptoms of posttraumatic stress disorder (PTSD), anxiety and depression up to 6 months after the onset of COVID-19 – related symptoms	Quantitative	N = 239 patients with confirmed COVID-19 Gender= 82.8% females. Age = 39-56 years (M = 50).	Self-reported health status significantly worsened 3 months after infection and during the 6-month follow-up. At 3 months after symptom onset, 37.2% of patients were at risk for PTSD, which decreased to 26.8% at the 6-month follow-up. At 3 months after symptom onset, patients referred difficulty concentrating (84.5%), difficulty falling asleep or staying asleep (71.1%), and disturbing thoughts or memories about the event that have come to their mind against their will (56.5%). At 3-month follow-up of the patients, clinically relevant symptoms of anxiety and depression were detected in 35.6% and 46.9%, respectively. The prevalence of anxiety and depressive symptoms remained high at the 6-month follow-up (34.7% for anxiety symptoms and 40.6% for depressive symptoms).	STROBE (19/22)

REFERENCE	OBJECTIVE	METHODS*	SAMPLE	MAJOR FINDINGS	METHODOLOGICAL QUALITY
Ireson et al., 2022/ UK	To explore the physical and epistemic challenges of living with long COVID.	Qualitative (thematic analysis of patient stories)	N = 66 patients' stories	Most of the participants reflected that on several occasions they have not been taken seriously during healthcare before long COVID was officially recognized (mainly if they were young and healthy people), making them vulnerable to the physical, mental, and emotional impact of having to cope on their own. Therefore, it had important consequences for later stages of their disease trajectory and care.\nInternet was an element of support for patients who had felt let down by health services. It was common for people with persistent symptoms to try diets, medications, and supplements to improve their state of health.	SRQR
Jiménez-Rodríguez et al., 2022/ Spain	To analyze the associations between post-COVID-19 characteristics with up to 6-months of follow-up in hospitalized and non-hospitalized patients.	Quantitative (cohort study): clinical data. First follow-up consultation (FFuC): two months after COVID-19 diagnosis. Second follow-up consultation (SFuC): six months after initial diagnosis.	N = 217 patients Gender= 53.5% males. Age= 49-68 years (*M*= 59).	In the FFuC, the most prevalent symptoms were dyspnoea (53.6%), fatigue (53.5%), emotional involvement (53.9%) and depression (57.1%). Abnormal radiological findings continued to be present in 30.3% of patients during the study. In the SFuC, 73.3% of patients continued to present symptoms or claimed to develop new symptomatology after the acute process that was not related to alternative diagnoses. Dyspnoea (42.5%), fatigue (47.8%), hair loss (22.7%), emotional involvement (44%) and depression (21.7%) were the most frequent symptoms. Other alterations such as memory, concentration and language deficits began to appear reflecting a cognitive deficit in 27.1% of the cases, as well as erectile dysfunction or decreased sexual appetite (1.4%). In general, female sex is favorable for the persistence of the symptomatology. The most frequent affected parameter is the alteration of the pulmonary diffusion capacity in both hospitalized and non-hospitalized patients.	STROBE (17.3/22)
Kersten et al., 2022/ India	To analyse the correlation between the physical and mental burden of symptoms of long COVID patients and the findings of a somatic evaluation.	Quantitative (cohort study using SF-36 questionnaire: physical function, physical role, bodily pain, general health, vitality, social function, emotional role, mental health and health transition and clinical data.	N = 367 patients. Gender= 57.5% females Mean age= 47.3 years.	The most common symptoms in long COVID unit were fatigue (51.1%) and dyspnea (42.5%). A positive correlation between initial disease severity (need for hospitalization, intensive care medicine) and resulting symptom burden at follow-up (at least 3 months of follow-up) could be demonstrated. There was a significant correlation between symptom severity and reduced exercise tolerance in the 6-Minute walk test and diffusion capacity for carbon monoxide among patients with long COVID. Patients with impaired subjective physical and mental status were significantly more likely to be women.	STROBE (20.1/22)
Kingstone et al 2020/ UK	To explore experiences of people with persisting symptoms following COVID-19 infection, and their views on primary care support received.	Qualitative (semi-structured interviews by telephone or video call).	N = 24 people with self-reported experiences of long COVID Gender= 79% females. Age= 20 – 68 years (*M* = 43.20).	None of the participants were hospitalized during their initial (suspected or confirmed) COVID-19 infection. Results show the patients' overload of having to endure and manage the persistent symptoms of long COVID, as well as living with uncertainty and fear as to whether full recovery is possible.\n\nDue to the chronic fatigue, some of the participants consumed vitamins C, D, B12 or Zinc to alleviate their symptoms, without the recommendation of a doctor. They also expressed the difficulty of finding answers to their symptoms, so some people resorted to online support groups; while for some of them it was somewhat favourable, for others, it increased their anxiety and concern.\nSome participants noted that their experiences made them feel that they were not entitled to health care, and they referred to the importance of finding a Primary Care physician with empathy and understanding.	SRQR

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REFERENCE	OBJECTIVE	METHODS*	SAMPLE	MAJOR FINDINGS	METHODOLOGICAL QUALITY
Ladds et al., 2020/ UK	To understand the perceptions of healthcare workers with long COVID in order to propose the creation of a model of care for the management of this disease.	Qualitative: Online focus groups, individual narrative interviews or symptom diaries and statements.	N = 43 healthcare professionals with long COVID. Mean age= 40 years. Gender= 81.39% females.	On the one hand, the absence of guidelines increases the uncertainty regarding long COVID. On the other hand, similarly, the participants positively mention the support and follow-up received through therapeutic relationships. Even so, the need for improvement in medical services is highlighted. Health professionals emphasize reflexivity and improvement, the sharing of knowledge and experience, and the promotion of research and the subsequent improvement of evidence-based services. However, participants were sceptical of these proposals due to financial constraints, staff shortages and the nature of change within the National Health System.	SRQR
Matsumoto et al., 2022/ Japan and Sweden	To investigate post-COVID conditions and their effects on the mental health of participants from Japan and Sweden.	Quantitative study. COVID-19 Fear Scale-19 (FCV-19S); the Patient Health Questionnaire-9 (PHQ-9); the General Anxiety Disorder-7 (GAD-7) item and the Impact of Events Scale-Revised (IES-R).	N = 763 adults (387 Japanese and 376 Swedish) Gender= 63.8% males. Mean age: 36.7 years.	The risk of developing mental disorders in participants who had passed COVID-19 infection and who continued with persistent symptoms (among Japanese were dysgeusia, fatigue, tiredness, olfactory dysfunction, chest pain, cough and palpitations; among Swedes, were fatigue, tiredness, olfactory dysfunction and fever) was at least 2 times higher than in participants without this condition. In the COVID-19 experience group the percentage of people who exceeded the cut-off was 39.3% for depression, 24.4% for generalized anxiety, and 50.4% for post-traumatic stress disorder (PTSD).	STROBE (21/22)
Menges et al., 2021/ Switzerland	To assess the impaired health (both physical and mental) among individuals after SARS-CoV-2 infection and characterize the healthcare utilization.	Quantitative (cohort study). Fatigue Assessment Scale (FAS); the modified Medical Research Council (mMRC) dyspnoea scale; depression, anxiety and stress scale (DASS-21) and health- related quality of life using the EQ-5D-5L instrument and Visual Analogue Scale (VAS).	N = 431 adults. Gender=50% females Age= 33-58 years (M = 47)	Between six and eight months, 40% reported at least one post-SARS-CoViD-19 related GP visit and 10% of individuals were re-hospitalized, 26% reported not fully recovered, and one-third of them did not seek further health care. The presence of severe symptoms during the acute phase was related to comorbidities and not complete recovery. The higher the percentage of female participants and initially hospitalized, they reported not having recovered completely compared to non-hospitalized men. Regarding symptoms, 55% reported fatigue, 25% dyspnoea, and 26% depression. Depressive symptoms were more frequent in older women, and younger participants and women more frequently expressed stress symptoms compared to older individuals and men. Dyspnoea, fatigue, and depressive symptoms were associated with more health contacts after acute COVID-19 infection.	STROBE (20.3/22)
Mirfazeli et al., 2022/ Iran	To investigate the association between clinical manifestation of the COVID-19 and the experience of future long COVID symptoms.	Quantitative (clinical information by telephone interviews, including the Persian version of the Montreal Cognitive Assessment (MoCA-BLIND 7.1).	N = 95 outpatients and Inpatients) Gender= 58% males. Age= 28-86 years (M = 50)	Constitutional neuropsychiatric symptoms in the acute phase (e.g., headache, decreased limb strength, anosmia, hypogeusia, fever and weakness) predicted chronic fatigue syndrome at follow-up, and specific neuropsychiatric symptoms (e.g., photophobia, change of mental status, hallucination, vision and speech problems, seizures and balance disturbances, diarrhea, nausea, cough, and dyspnoea) were associated with gastrointestinal symptoms in the long COVID. Respiratory symptoms in the acute phase predicted future symptoms of anosmia and dysgeusia at follow-up.	STROBE (18.4/22)

REFERENCE	OBJECTIVE	METHODS*	SAMPLE	MAJOR FINDINGS	METHODOLOGICAL QUALITY
Murch et al., 2022/ UK	To investigate whether COVID-19 illness is associated with increased post-acute healthcare utilization.	Quantitative (case–control study using linked data from healthcare services)	N = 7791 patients	For hospitalized COVID-19 cases, a significant increase in non-elective admissions was identified for men and women <65 years.	STROBE (20.7/22)
Rass et al., 2022/ Austria	To describe the history of neurological manifestations (neurological signs, symptoms and diseases, neurocognitive and neuropsychiatric complaints) over 1 year after COVID-19.	Quantitative (cohort study) through a neurological examination and standardized tests: assessment of hyposmia (16-item Sniffin' Sticks test); cognitive deficits (Montreal Cognitive Assessment < 26) and mental health (Hospital Anxiety and Depression Scale and Post-Traumatic Stress Disorder Checklist 5).	N = 81 patients. Gender= 59% males Age= 47- 64 years (*M*=54).	New and persistent neurological disorders were found in 15% of patients after 3 months infection and in 12% after 1 year. Cognitive impairment was evident in 18% after 1 year compared with 23% at 3-month follow-up. Fifty-nine percent of the participants reported persisting neurological symptoms at 1-year follow-up, including fatigue (38%), concentration difficulties (25%), forgetfulness (25%), sleep disorders (22%), myalgia (17%), weakness in the extremities (17%), headache (16%), altered sensation (16%) and hyposmia (15%). Neurological examination revealed abnormalities in 61% patients without improvement over 3 months. One year after infection, 29% reported anxiety, 10% post-traumatic stress disorder and 6% depression, and these disorders had not improved after the 3-month follow-up.	STROBE (19.6/22)
Razai et al., 2021/ UK	To know the symptoms of long COVID, the experiences of patients with COVID, and recommendations for improving healthcare services.	Qualitative (telephone interviews).	N = 48 patients diagnosed with COVID. Gender=66% females. Age= 19-82 years (*M*=49).	The most common symptom was severe fatigue (45%), followed by dyspnoea (30%), neurocognitive difficulties (30%), headaches (20%) and joint pain (20%). Many participants reported the severe impact of long COVID on their lives, both physically and mentally. Patients expressed fear, because of the uncertainty of long COVID and for not obtaining health advice, due to the difficulty in accessing face-to-face general practice services during the pandemic and the delay in getting an appointment. To improve patient support and care, participants considered a regular follow-up and phone calls from healthcare personnel necessary (56%) and indicated that a virtual support group would be helpful.	SRQR
Rivera-Izquierdo et al 2022/ Spain	To explore the presence of persistent symptoms 12 months after discharge in patients hospitalized due to COVID-19.	Quantitative (cohort study through telephone interviews).	N = 906 patients (453 inpatients due to COVID-19 and 453 inpatients due to other causes) Gender: 52% males Mean age: 58.55 years.	Patients hospitalized with COVID-19 showed a higher prevalence of persistent respiratory, neurological and anxiety symptoms than the inpatients due to other diseases. The incidences most associated with COVID-19 hospitalization were persistent pharyngeal symptoms, confusion or memory loss, and anxiety. A higher frequency of persistent respiratory and systemic symptoms was observed in men, and a higher prevalence of persistent mental health symptoms (especially anxiety and depression) in women. Older patients had a higher prevalence of persistent cardiovascular, neurological, and systemic symptoms, while younger patients showed a higher frequency of persistent mental health and digestive symptoms.	STROBE (21/22)

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REFERENCE	OBJECTIVE	METHODS*	SAMPLE	MAJOR FINDINGS	METHODOLOGICAL QUALITY
Romero-Duarte et al., 2021/ Spain	To identify the presence of sequelae or persistent symptomatology during the 6 months after discharge from COVID-19.	Quantitative (retrospective observational cohort consulting medical records).	N = 797 patients. Gender = 63.9% females. Mean age = 63 years	Women presented more frequently persistent headache and mental health symptoms. Among the sample, 20.1% of patients returned to the emergency department (ED), 4.4% required hospital readmission and 1% died during follow-up. The main persistent symptoms requiring return to the ED were persistent fever, dermatological symptoms, arrhythmia or palpitations, chest pain and pneumonia. The main sociodemographic factor associated with post-discharge mortality was advanced age.	STROBE (21/22)
Taylor et al., 2021/ UK	To explore experiences of doctors with long COVID.	Qualitative (semi-structured telephonic or video call interviews).	N = 13 doctors Gender= 84.61% females.	Participants were afraid of being stigmatized due to their symptoms and expressed concern about the workload they added to their family members and co-workers. They also reported difficulty in getting a referral to a specialist from their primary care physician. They feared that their symptoms represented a serious pathology (e.g., pulmonary embolism or myocarditis) and they worried that their health problems would not be investigated and that they would not be able to recover.	SRQR
Titze-de-Almeida et al., 2022/ Brazil	To analyse whether acute COVID-19 symptoms persist in long COVID and to examine the correlation between memory problems and sleep, depression, and anxiety.	Quantitative (cohort study): Generalized Anxiety Disorder 2-item questionnaire (GAD-2) and ad hoc questionnaire on sleep disturbances, depression, memory, and comorbidities.	N = 236 patients (86.3% non-hospitalized). Gender= 61% females M = 41.2)	While in the acute phase of COVID-19 the most common symptoms were myalgia (50%), hyposmia (48.3%) and dysgeusia (45.8%), in long COVID were fatigue (21.6%), headache (19.1%) and myalgia (16.1%). Memory problems were reported by 39.8% of the participants and were related to having sleep problems (45.8%), feeling depressed (44.9%) and anxious (36.9%).	STROBE (20.6/22)
Twomey et al., 2022/ Canada	To assess persistent symptoms and limitations in people with long COVID.	Quantitative: The Functional Assessment of Chronic Illness Therapy; the Fatigue Scale and the DePaul Post-Exertional Distress Symptom Questionnaire.	N = 213 participants Gender=85.4% females Age: 18- 79 years.	Persistent symptoms for more than 6 months were experiencing by 72.3% of the participants, and chronic fatigue and significant respiratory discomfort were the most frequent symptoms (71.4% and 55.2%). Health-related quality of life was significantly impaired in persons with long COVID compared to general population characteristics, so that 42.3% of the participants indicated that long COVID prevented them from returning to work, and 41.8% had to reduce their working hours. Only 5.2% of the participants were able to work as usual. Finally, 68.1% of patients reported a feeling of heaviness after starting to exercise and 85.4% indicated that minimal physical exercise made them tired.	STROBE (21/22)
Vagheggini et al 2022/ Italy	To evaluate the impairment at three-months in patients who successfully recovered from acute COVID-19.	Quantitative (cohort study) using medical records and online scales: Visual analogue scale (QoL); Zung's Self-rating Anxiety Scale (SAS); King's Brief Interstitial Lung Disease (K-BILD); Impact of Event Scale-Revised (IES-R); Insomnia Severity Index (ISI); Beck Depression Inventory-II (BDI-II) Functional Assessment of Chronic Illness Therapy, Fatigue subscale (FACIT-F); 12-Item Short-Form Health Survey (SF-12); 14-Item Resilience Scale (RS-14).	N = 21 patients Gender= 61.90% males Mean age= 57.05 years	On a physical level, 52.4% of patients showed altered respiratory gas exchange capacity. Changes in lung function and lung ultrasound were associated with worsening quality of life, fatigue, and symptoms of psychological distress. The perceived physical health score was lower than expected in the general population samples, but higher in patients with chronic obstructive pulmonary disease. Correlation analyses in the group with pathological diffusing capacity for carbon monoxide showed that higher echo scores were significantly associated with depressive symptoms. In fact, 9.5% of patients showed depressive symptoms, 28.6% post-traumatic stress symptoms, 14.3% anxiety and 9.5% had insomnia.	STROBE (21/22)

REFERENCE	OBJECTIVE	METHODS*	SAMPLE	MAJOR FINDINGS	METHODOLOGICAL QUALITY
Vaira et al., 2022/ Italy	To investigate the associations between physical and mental health-related QoL scores and the persistence dysfunctions at least 6 months after the diagnosis of SARS-CoV-2 infection.	Quantitative (online survey). COVID-19 symptom index, Visual Analog Scale (VAS) and SF-12 questionnaire.	N =431 participants with persisting CO-VID- 19 symptoms. Gender= 76.3% females. Age=12-71 years (*M* = 38.4)	The most frequent persistent symptoms were fatigue (42.9%), hyposmia (25.2%), olfactory dysfunction (29.5%), gustatory dysfunction (22.3%) and muscle pain (19.3%). Among participants with persistent olfactory dysfunction, 87.4% reported an associated dysfunction (e.g., parosmia or phantosmia). Ageusia was reported by 2.8%, while hypogeusia was detected in 19.5% of cases. The most respondents reported dysgeusia in association with a qualitative taste dysfunction (93.7%).	STROBE (19.3/22)
Vanichkachorn et al., 2021/ USA	To describe characteristics of patients reporting long COVID symptoms.	Quantitative (diagnosis test, clinical data)	N = 100 patients. Gender: 68% females. Mean age: 45.41 years.	The presence of respiratory diseases prior to coronavirus infection was discovered in 23% of patients, mainly asthma diagnoses. Other pre-existing diseases were depression or anxiety (34%), hypertension (19%), chronic fatigue syndrome (4%) and diabetes (3%). The most common symptoms during covid-19 infection were fatigue (80%), respiratory discomfort (59%) and neurological discomfort (59%). Other common symptoms were cognitive disturbances (45%), sleep disturbances (30%) and mental health symptoms (26%). Seventy five percent of patients had not been hospitalized for SARS-CoV-2 infection; 34% reported difficulties in performing basic activities of daily living (e.g., showering, dressing, sleeping), and 84% of patients reported problems with instrumental activities of daily living (e.g., household chores, driving, and/or completing required tasks at work).	STROBE (17.8/22)

Discussion

This review shows that beyond acute infection with COVID-19, there is a significant number of patients who are persistently affected. In these cases, clinical symptoms are maintained over time or worsened, and others appear as new symptoms, mainly respiratory, musculoskeletal, cognitive, and psychological, all of which affect the biopsychosocial health of individuals. Furthermore, as other studies show[39], women were at higher risk than men of developing long-term symptoms after acute COVID-19 infection (e.g., anxiety, depression, poor sleep quality), therefore, it is essential that healthcare systems consider gender differences when treating these patients.

The most common clinical manifestations of long COVID have decreased quality of life even on average 48 days after the acute phase of COVID-19, generating pain and discomfort, and affecting mobility, self-care ability and usual activities such as work or household chores, and all of this impact in a negative way on the individual's social life[39].

Other studies highlight the negative impact of COVID-19 on mental health[33,31,25]. On the one hand, there is very limited evidence that pharmacological approaches may be effective in treating the neuropsychological sequelae of long COVID[46]. On the other hand, the lack of preparedness and inconsistencies in guidelines, coping strategies, unemployment, economic loss, physical detachment, isolation, chaos, and uncertainty are some of the factors leading to increased emotional distress, anxiety, and depression. Therefore, there is an urgent need for research on this topic to avoid lasting adverse effects on the population as well as to develop strategies to prevent people from progressing to more severe stages of mental problems[25]. In addition, experts recommend establishing regular daily rhythms, maintaining mindfulness, self-compassion, and activity, connecting with others and find sources of joy and inspiration[29].

It is clear that planning the healthcare of those affected by long COVID reduces the probability of collapsing the healthcare system or misusing healthcare resources, which favors a cost reduction. On the other hand, it is especially important to pay attention to the experiences of people with long COVID, since many of them reported feeling "abandoned" or "discarded" by health professionals because health services and physicians were too busy treating acute cases of COVID-19, so they received limited or conflicting advice for rehabilitation and self-management of this pathology[29]. This could lead to people's exhaustion and feelings of guilt or anger that make the therapeutic relationship difficult, causing patients to opt for advice

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and information without scientific evidence that could lead to worse outcomes[29].

Some proposals to provide care were related to the use of technologies. Integrative community therapies that developed online psychosocial interventions within the public health system promote support networks, positive emotions, and personal coping resources, and reduce anxiety and depression, stigma, and fear. In addition, psychological counselling services and health educational information can be shared online with programs such as WeChat, Weibo and TikTok[35-37]. However, consideration should be given to potential drawbacks (e.g., communication problems and symptom assessment difficult) and inequalities such as limited access to technologies, educational inequalities, or cultural peculiarities, which may limit access to and use of digital health intervention platforms. To reverse the current situation of unsatisfactory care demand with available resources, it is necessary to consider the severity of symptoms, the age range of those affected, gender differences and functional impact, all of which have implications for care and resource needs[29].

On a physical health, fatigue is one of the most persistent symptoms up to more than a year after suffering from COVID-19[39]. Due to fatigue, patients affected by post-COVID condition reported loss of ability to work, limitation of prospects of finding new employment and income reduction[39]. The International Labor Organization warned of the risks of discrimination that people with persistent symptoms could suffer, resulting in socio-occupational and psychological deterioration of people and their family. On the one hand, the consequences of long COVID could lead to similar measures for other pathologies to protect workers in the workplace, causing less psychological overload in patients and improving recovery. Some of these strategies could be occupational health surveillance and adaptation to the job, reduction of the working day and more breaks during the working day, a leave of absence or suspension of the contract while the patient's wellbeing improves, keeping sickness benefits and social assistance.

Limitations

This review has some limitations that should be considered while examining our results. First, limitation on data in this general review includes that there are sometimes incomplete data sets that do not always capture key details (i.e., whether participants have been hospitalized for COVID-19, if they were diagnosed with long COVID). Second, since this is a highly topical topic, it is possible that we have missed studies published while writing the manuscript.

Conclusions

The health and quality of life of people with long COVID is affected due to the maintenance, worsening and appearance of new physical symptoms, and the psychosocial impact. Furthermore, many patients have not reported good experiences searching for health resources. After the first years of the pandemic, patients with long COVID express dissatisfaction with health care, lack of empathy and incomprehension of their symptoms, and difficulties for referral to specialists.

Conflict of interest

No conflict of interest has been declared by the author(s).

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ORIGINAL

The Impact of a Fresh Sheep Cadaver Model on Preventing Complications in Posterior Pedicle Screw Placement Training

El impacto de un modelo de cadáver de oveja fresca en la prevención de complicaciones durante el entrenamiento en la colocación de tornillos pediculares posteriores

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Abstract

Objective: The aim of this study was to present a cost-effective, easily accessible, and reproducible sheep model for neurosurgical residents to practice the transpedicular screw fixation technique.

Materials and methods: The sheep spine model used in the research was obtained from a slaughterhouse in Pendik, Istanbul, under the supervision of a veterinarian. A fresh cadaveric thoracolumbar spine section was harvested from a 2-year-old sheep, and following collection, it was preserved at a temperature of +4°C for 6 hours prior to use in the experiment.

Results: A five-step plan was implemented to develop a laboratory training model focused on the application of posterior pedicle screws in a fresh sheep cadaver spine. The procedure began by positioning the sheep spine in a prone orientation and initiating imaging using a C-arm fluoroscope to identify the spinous processes. An incision was made through the skin, subcutaneous tissue, and fascia using a scalpel and monopolar cautery, followed by the dissection of paravertebral muscles. The pedicle entry point was located at the intersection of lines drawn in the axial and sagittal planes and confirmed using fluoroscopy. After decorticating the facet with a Kerrison rongeur, the pedicle tract was prepared for screw placement. A 4.5x3.5 mm transpedicular screw was inserted into the vertebral body, and its positioning was confirmed using both fluoroscopy and a CT scan.

Conclusion: This study successfully demonstrated the development of a cost-effective and accessible sheep spine model for transpedicular screw fixation training.

Key words: Sheep spine, animal training model, pedicle, screw fixation.

Resumen

Objetivo: El objetivo de este estudio fue presentar un modelo de oveja rentable, fácilmente accesible y reproducible para que los residentes de neurocirugía practiquen la técnica de fijación con tornillos transpediculares.

Materiales y métodos: El modelo de columna de oveja utilizado en la investigación se obtuvo de un matadero en Pendik, Estambul, bajo la supervisión de un veterinario. Se extrajo una sección de columna toracolumbar fresca de una oveja de 2 años de edad, y tras su recolección, se conservó a una temperatura de +4°C durante 6 horas antes de su uso en el experimento.

Resultados: Se implementó un plan de cinco pasos para desarrollar un modelo de entrenamiento de laboratorio enfocado en la aplicación de tornillos pediculares posteriores en la columna de una oveja fresca. El procedimiento comenzó posicionando la columna de la oveja en orientación prona e iniciando la obtención de imágenes con un fluoroscopio en C para identificar las apófisis espinosas. Se realizó una incisión a través de la piel, el tejido subcutáneo y la fascia utilizando un bisturí y un cauterio monopolar, seguida de la disección de los músculos paravertebrales. El punto de entrada del pedículo se localizó en la intersección de líneas trazadas en los planos axial y sagital, y se confirmó mediante fluoroscopia. Después de decorticar la faceta con un rongeur de Kerrison, se preparó el trayecto del pedículo para la colocación del tornillo. Se insertó un tornillo transpedicular de 4.5x3.5 mm en el cuerpo vertebral, y su posición se confirmó mediante fluoroscopia y tomografía computarizada.

Conclusión: Este estudio demostró exitosamente el desarrollo de un modelo de columna de oveja accesible y rentable para el entrenamiento en fijación de tornillos transpediculares.

Palabras clave: Columna de oveja, modelo de entrenamiento animal, pedículo, fijación con tornillos.

Introduction

Simulation has become a cornerstone in modern medical education, providing a risk-free environment where learners can perform tasks that mirror real-life clinical situations[1-3]. It allows trainees to practice and refine their skills without exposing patients to potential harm. Simulation is well established in various fields, such as emergency medicine, and has gained significant traction in surgical education, particularly in neurosurgery. Therefore, developing surgical expertise is vital for ensuring patient safety, and simulation offers an invaluable tool for acquiring these skills[2,4].

Neurosurgical simulations have utilized various biological and non-biological materials, including live animals, cadavers, synthetic models, and digital simulations. Non-living animal models, in particular, stand out due to their affordability, close resemblance to human anatomy, realistic tactile feedback, and ease of access compared to non-biological alternatives[5,6].

In spinal surgery, transpedicular screw fixation is a commonly used technique for stabilizing the posterior lumbar spine in cases of trauma, tumors, infections, and degenerative diseases[7-9]. However, its steep learning curve for novice surgeons necessitates structured simulation-based training to develop precision and avoid complications. Simulation models, such as those highlighted by Al-Sharshahi's review, including non-living animal models like sheep, cows, and swine, provide cost-effective, anatomically accurate platforms for training[10]. These models replicate various neurosurgical and spinal approaches, facilitating skill acquisition in a risk-free environment.

The aim of this study was to present a cost-effective, easily accessible, and reproducible sheep model for neurosurgical residents to practice the transpedicular screw fixation technique.

Materials and methods

Preparation
This study was conducted at the 2nd Neurosurgery Clinic of Dr. Lütfi Kırdar Kartal Training and Research Hospital. The sheep spine model used in the research was obtained from a slaughterhouse in Pendik, Istanbul, under the supervision of a veterinarian. A fresh cadaveric thoracolumbar spine section was harvested from a 2-year-old sheep, and following collection, it was preserved at a temperature of +4°C for 6 hours prior to use in the experiment.

Imaging
The imaging was conducted using a digital camera (Nikon Coolpix 4500, Japan). Radiological evaluations were performed with a C-arm fluoroscopy unit (Ziehm 8000, Germany) and a computed tomography (CT) scanner (Siemens, Germany), ensuring comprehensive and high-resolution imaging for the study's purposes.

Surgical instruments
The surgical instruments used in the study included a Kerrison rongeur, periosteal elevator, awl, probe, tap, skin retractor, pedicle screws (5.5x3.5 mm), rods, and connectors. These instruments had previously been used in the clinic and were outdated, no longer actively employed in clinical practice. It is important to note that the surgical tools currently in use for patient procedures were not utilized in this study. Instead, older instruments that had exceeded their service life were used to maintain the integrity and ethical standards of clinical practice.

Results

A five-step plan was implemented to develop a laboratory training model focused on the application of posterior pedicle screws in a fresh sheep cadaver spine.

Step 1: The sheep spine was placed in a prone position, and imaging was initiated using a C-arm fluoroscope. The location of the spinous processes was identified through the images obtained (**Figure 1**).

Figure 1: Initial fluoroscopic image.

Step 2: An incision was made in the skin, subcutaneous tissue, and fascia, first using a scalpel and then with the assistance of monopolar cautery. Dissection was performed with a periosteal elevator and gauze, ensuring proper exposure. Subsequently, paravertebral muscles were dissected subperiosteally from the laminae and separated (**Figure 2**).

Figure 2: Dissection of paravertebral muscles.
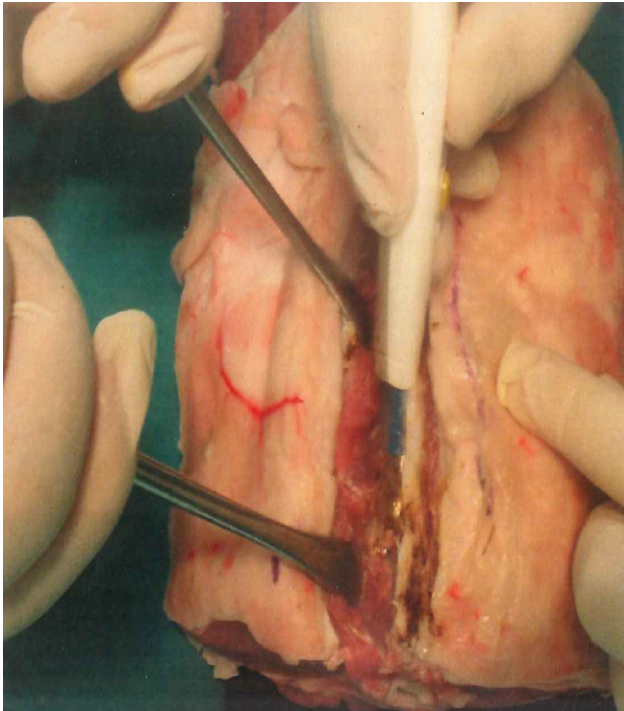
Step 3: The pedicle is located at the intersection of two lines: one drawn in the axial plane along the transverse process and the other in the sagittal plane toward the lateral superior facet. This point was confirmed using fluoroscopy. The lamina and facet were identified. The facet was decorticated with the help of a Kerrison rongeur. The pedicle entry point was also confirmed using fluoroscopy, and the entry tract for the pedicle screw, from the pedicle to the vertebral body, was prepared. The tract was further optimized using a tap to ensure proper placement of the pedicle screw (**Figure 3**).

Figure 3: Confirmation of pedicle entry point.
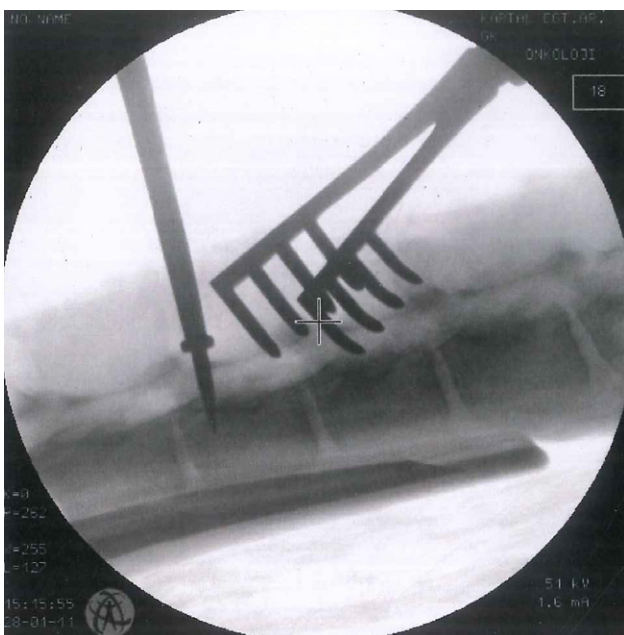
Step 4: A 4.5x3.5 mm transpedicular screw was inserted and directed toward the vertebral body. The pedicle screw was gradually advanced into the vertebral body (**Figure 4**).

Figure 4: Pedicle screws and rods placed in between.
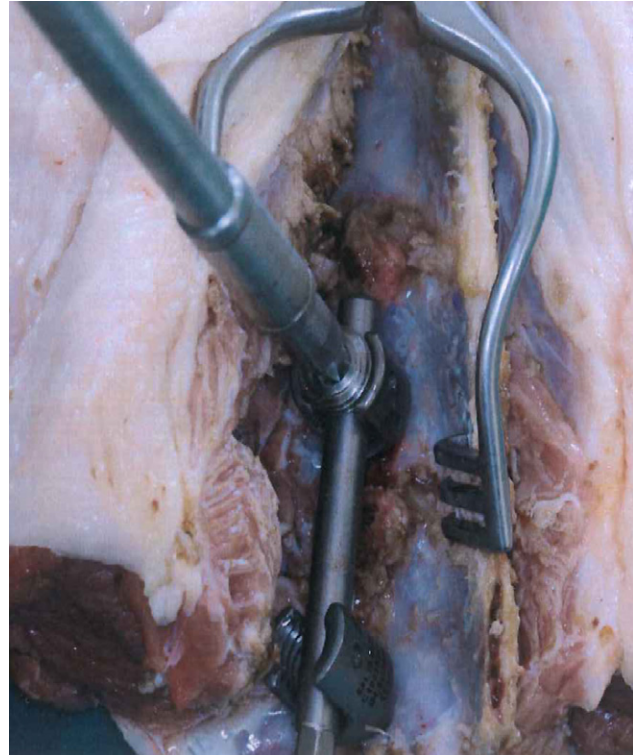
Step 5: The final position of the screw was confirmed using C-arm fluoroscopic imaging to ensure accurate placement (**Figure 5**).

Figure 5: Confirmation of the placed pedicle screw with C-arm fluoroscopy.

After all procedures were completed, a CT scan was performed on the sheep spine where the pedicle screws were placed. The positioning of the screws was confirmed in the axial plane using the CT images (**Figure 6**).

Figure 6: Final confirmation with axial CT.

Discussion

The development of a sheep spine model for transpedicular screw fixation training offers a valuable addition to neurosurgical education. The use of this cost-effective, easily accessible model allows residents to practice and refine their surgical skills in a controlled, risk-free environment, closely simulating real-life clinical scenarios. The anatomical similarity of the sheep spine to the human spine enhances the realism of the training, providing a practical alternative to more expensive or ethically challenging models, such as cadavers. This approach allows trainees to gain hands-on experience, improving their precision and familiarity with pedicle screw placement before transitioning to clinical practice.

Posterior rigid segmental stabilization is the most commonly used form of instrumentation for the thoracolumbar region. Pedicle screws were introduced for posterior stabilization in 1963 by Roy-Camille. Initially, it was used in cases of lumbar fractures, metastases, primary spinal tumors, and high-grade lumbar-sacral fusion for spondylolisthesis treatment[11,12]. The aim of this fusion technique is to minimize damage to normal anatomy, although potential disadvantages arise from the technical difficulties associated with the system's use. Complications linked to instrumentation include pedicle fractures, dura damage, nerve root injury, arachnoiditis, vascular injury, and retroperitoneal or intraabdominal damage, with an incidence of 10-25%[13]. Incorrect placement of pedicle screws can lead to significant complications, including neurological damage, with a reported incidence of up to 42%[14]. For example, if the screw breaches the superior wall of the pedicle, posterior stabilization cannot be adequately achieved. To mitigate these risks, accurate placement and sufficient anatomical knowledge are essential, as well as avoiding nerve and vascular injuries through precise screw positioning.

Numerous training models related to neurosurgery have been proposed in the literature. Hamamcıoğlu et al. outlined a four-step method for simulating microneurosurgical dissection of cranial nerves in the posterior fossa using a fresh cadaveric sheep brain. They concluded that the model was effective and successful in replicating the procedure[15]. Aboud et al. concluded that their developed cadaver model for neurosurgical training offers a unique and practical approach to simulating live surgery. The model mimics normal human anatomy with dynamic vascular filling and pulsation, providing trainees with a realistic environment to practice surgical techniques. It allows for a wide range of procedures, including craniotomies, vascular suturing, aneurysm management, and skull base approaches, offering a superior alternative to both traditional cadaveric specimens and live animals[16].

Boyacı et al. concluded that augmented reality (AR) significantly improves the safety of cervical pedicle screw fixation compared to the traditional free-hand technique. Their experimental study on 3D-printed vertebra models demonstrated that AR increased screw insertion accuracy, with 77.8% of screws in the AR group classified as safe, compared to 33.3% in the free-hand group[17]. In 2009, Walker et al. introduced a cost-effective, reproducible simulator for minimally invasive spine surgery, aimed at enhancing resident training before operating room practice. The simulator effectively increased residents' confidence in performing minimally invasive laminectomy and pedicle screw placement[18]. In 2011, Anderson further reported the development of two additional spine simulation models at the University of Wisconsin, focusing on dural repair and laminoplasty[19]. Kalayci et al. identified that using sheep spine provides a suitable, cost-effective, and practical model for lumbar discectomy training. Due to its similarity to the human spine, it contributes to the development of surgical skills[20].

Bohl et al. evaluated the Living Spine Model (LSM), a 3D-printed surgical training tool for open posterior lumbar surgery (21). Six surgeons with varying experience levels performed pedicle screw fixation and laminectomy on

the LSM. The study assessed face and content validity using NASA TLX scores. Junior residents took longer to complete tasks, with fewer successful outcomes compared to senior residents and an attending surgeon. The results showed excellent face validity and content validity, indicating the LSM's high potential for surgical education. Their model may become a key component in surgical training. Rahm et al's study assessed the stabilizing effect of the rib cage on adjacent segment motion after thoracolumbar posterior fixation in human thoracic cadaveric spines[22]. Their results highlight the importance of including the rib cage in biomechanical testing to avoid overestimating adjacent segment instability. This finding is critical for improving the accuracy of surgical techniques and instrumentation in thoracic spine surgery.

Traditional animal models such as goats, dogs, pigs, horses, seals, and dolphins have been widely used in experimental studies. However, many of these models present significant economic, social, and medical challenges, both in terms of procurement and practical application. In contrast, the sheep spine model we use avoids these issues entirely, making it a far more accessible and cost-effective option. It offers a practical solution without the ethical, economic, or logistical concerns that come with using other animals, making it a highly feasible model for training and research purposes.

Our model for the posterior lumbar pedicle screw placement technique is time-consuming and prone to complications, which is why it is typically practiced in the later stages of specialist training. However, with the sheep cadaver model we developed, this technique can be safely learned even by assistants with no prior surgical experience. Using fresh sheep spines offers both cost advantages and easier accessibility compared to other animal models used in the literature, minimizing ethical concerns. The model does not require anesthesia, allows multiple repetitions without time constraints, and serves as an effective training tool for improving surgical skills in posterior pedicle screw placement. We believe our model is a highly effective learning tool that is easy to transport and store, safe, practical, affordable, and simple to acquire. It is ideal for young neurosurgery residents eager to learn this technique and for neurosurgery and orthopedic specialists seeking to enhance their experience in this field.

Although the sheep spine model provides an accessible and cost-effective alternative for neurosurgical training, there are limitations to its use. While the anatomical structures of the sheep spine share similarities with the human spine, there are notable differences in size, vertebral morphology, and biomechanical properties. These differences may affect the accuracy and applicability of the training outcomes when transitioning to human patients. Additionally, the model may not fully replicate the complexity of human spinal anatomy, particularly regarding the pedicle size and angulation, which could limit the realism of screw placement in comparison to actual clinical scenarios.

Conclusions

This study successfully demonstrated the development of a cost-effective and accessible sheep spine model for transpedicular screw fixation training. The model provides a reliable, reproducible, and practical tool for neurosurgical residents to enhance surgical skills in a risk-free environment.

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ORIGINAL

Assessment of oral health literacy and DMFT index score in multiple sclerosis patients

Evaluación de la alfabetización en salud bucodental y la puntuación del índice DMFT en pacientes con esclerosis múltiple

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Abstract

Background: Multiple sclerosis (MS) is a chronic demyelinating disease that affects the central nervous system.
Objectives: The aim of this study was to investigate the oral health literacy and DMFT index score in multiple sclerosis patients.
Methods: In this study, which was conducted in 2024 in the city of Ilam and in the group of patients with multiple sclerosis, oral and dental health literacy and the factors affecting it were investigated in the patients. The tools used included a demographic profile form, clinical examinations to evaluate the number of decayed (D), filled (F), and missing (M) teeth due to caries (T) and oral health literacy adult's questionnaire (OHL-AQ). At first, a list of MS patients was prepared and they were contacted to participate in the study. Then, the patients who met the inclusion criteria, the selection and research objectives were explained to them. data analysis was done using SPSS software version 16.
Results: In this study, M(SD) of OHL-AQ scale score was equal to 7.87(2.49) and M(SD) of DMFT index score was equal to 1.35(0.96). also result showed, in terms of OHL-AQ Score, 72.1% of patients were in the Unfavorable range, 16.4% in the Relatively favorable range, and 11.4% in the Favorable range in the studies, significant relationship was observed between DMFT status, D, M, and F scores with age status and OHL-AQ Score. So that in people with younger age or people with higher OHL score, the state of tooth decay and damage was less.
Conclusions: The OHL-AQ score of patients with MS in this study was reported to be low. For this reason, it is recommended to design and implement an educational program to improve the health literacy of patients with MS, especially the health literacy related to oral and dental diseases in these patients.

Key words: Oral health literacy, multiple sclerosis, Dental heaths.

Resumen

Antecedentes: La esclerosis múltiple (EM) es una enfermedad desmielinizante crónica que afecta al sistema nervioso central.
Objetivos: El objetivo de este estudio fue investigar la alfabetización en salud oral y la puntuación del índice DMFT en pacientes con esclerosis múltiple.
Métodos: En este estudio, que se llevó a cabo en 2024 en la ciudad de Ilam y en el grupo de pacientes con esclerosis múltiple, se investigó la alfabetización en salud oral y dental y los factores que la afectan en los pacientes. Las herramientas utilizadas incluyeron un formulario de perfil demográfico, exámenes clínicos para evaluar el número de dientes cariados (D), obturados (F) y ausentes (M) por caries (T) y el cuestionario de alfabetización en salud bucodental para adultos (OHL-AQ). En primer lugar, se preparó una lista de pacientes con EM y se contactó con ellos para que participaran en el estudio. A continuación, se explicó a los pacientes que cumplían los criterios de inclusión, la selección y los objetivos de la investigación. El análisis de los datos se realizó con el programa SPSS versión 16.
Resultados: En este estudio, la M(SD) de la puntuación de la escala OHL-AQ fue igual a 7,87(2,49) y la M(SD) de la puntuación del índice DMFT fue igual a 1,35(0,96). también resultado mostró, en términos de puntuación OHL-AQ, el 72,1% de los pacientes se encontraban en el rango desfavorable, el 16,4% en el rango relativamente favorable, y el 11,4% en el rango favorable en los estudios, se observó una relación significativa entre el estado DMFT, D, M, y las puntuaciones F con el estado de la edad y la puntuación OHL-AQ. De modo que en las personas de menor edad o con mayor puntuación OHL, el estado de caries y daño dental era menor.
Conclusiones: La puntuación OHL-AQ de los pacientes con EM en este estudio resultó ser baja. Por esta razón, se recomienda diseñar e implementar un programa educativo para mejorar la alfabetización en salud de los pacientes con EM, especialmente la alfabetización en salud relacionada con las enfermedades orales y dentales en estos pacientes.

Palabras clave: Alfabetización en salud oral, esclerosis múltiple, males dentales.

Background

Multiple sclerosis (MS) is a chronic demyelinating disease that affects the central nervous system. Although MS may be caused by genetics, Epstein-Barr virus infection, smoking, vitamin D deficiency, or obesity, the main causes of its development are still unknown[1-6].

Factors such as changes in diagnosis criteria, better access to health care, and people's awareness of the symptoms of the disease have led to an effective growth in the diagnostic process of this disease and a greater number of these patients are diagnosed[7]. This disease has affected about 2.8 million people in the world and has made great progress during the past decades[7,8]. According to the available statistics, about 200 people are added to its prevalence every week. Iran is one of the countries with high prevalence of MS. In fact, the prevalence of MS in Iran is higher than the standard and normal rate compared to its prevalence in the Middle East and Asia[9,10].

The clinical symptoms of MS are revealed at a stage of life when a person has to form a job and a family, which is why this disease will leave many negative effects on the mental-physical-economic condition of the patient, family and society[10]. In fact, due to the fact that during young adults, a wide disability occurs in the patient, the prevalence of disease complications, including psychological problems (including anxiety, fatigue, stress and depression), disability, impaired functional independence, and reduced quality of life in A high rate has been reported.

MS disease has different prevalence in different geographical regions. So that the results of the conducted studies show different rates of incidence and prevalence in different countries or even cities. In MS disease, in order to improve the understanding of the risk of the disease and support health policies related to meeting the needs of these patients, the existence of epidemiological data with good quality is needed[7,11,12]. In fact, identifying the complications of MS, including complications related to mouth and teeth, can be effective in identifying ways to improve the quality of life of these patients[11,13,14].

Oral and dental complications are another complication of MS. Pain, paraesthesia, trigeminal neuralgia, facial paralysis, hemifacial spasms, chronic periodontitis and tooth decay are among these complications[15,16]. If the patient has proper oral health literacy, he can be effective in diagnosing and managing these complications. Health literacy means a person's ability to acquire, process information and understand concepts related to health[17-19]. Oral health literacy (OHL) is considered as an important criterion in dentistry and is considered an important challenge in the world. OHL is an important and strong predictor of health-related behaviors and outcomes as an interaction between the health system and oral health outcomes[20,21].

Aim

The aim of this study was to investigate the status of oral health literacy and factors affecting it in multiple sclerosis patients in Ilam city.

Methods

Study Design and Development
In this study, which was conducted in 2024 in the city of Ilam and in the group of patients with multiple sclerosis, oral and dental health literacy and the factors affecting it were investigated in the patients.

Inclusion and Exclusion Criteria
The inclusion criteria included having MS according to the clinical record, living in Ilam city, having literacy, informed consent to participate in the study (completion of the questionnaire and oral and dental examinations) and age between 18-65 years. Exclusion criteria include incomplete completion of the questionnaire and the presence of any disease that prevents clinical examinations for the patient.

Questionnaire
The tools used included a demographic profile form, clinical examinations to evaluate the number of decayed (D), filled (F), and missing (M) teeth due to caries (T) and oral health literacy adult's questionnaire (OHL-AQ).

OHL-AQ: OHL-AQ scale has an area including concepts of reading comprehension, numeracy, listening comprehension and decision making. In this tool, one point is given for each correct answer and zero score is considered for the rest of the answers, and the final score is between zero and 17. The final score of oral and dental health literacy is divided into 3 categories, where a score of 0-9 is in the unfavorable, a score of 10-11 is in a relatively favorable, and a score of 12-17 is in the favorable. This tool has been validated and validated in a study conducted in Iran[22,23].

DMFT: In order to determine the DMFT index score, a dental student under the supervision of a dental specialist performed a clinical examination for the patients[24].

Data Collection
At first, a list of MS patients was prepared and they were contacted to participate in the study. Then, the patients who met the inclusion criteria, the selection and research objectives were explained to them. The researchers assured the patients that participating in this study would not have any complications for them and that the patients' information would be completely confidential.

Statistical Analysis
Data analysis was done using SPSS software version 16 and descriptive and analytical tests using mean, standard deviation, independent t, ANOVA and linear regression tests.

Result

In this study, M(SD) of OHL-AQ scale score was equal to 7.87 (2.49) and M(SD) of DMFT index score was equal to 1.35 (0.96) (**Table I** and **III**). also, M(SD) age of patients had 36.35 (5.9).

Result showed, in terms of OHL-AQ Score, 72.1% of patients were in the Unfavorable range, 16.4% in the Relatively favorable range, and 11.4% in the Favorable range (**Table II**).

Result showed, significant relationship was observed between DMFT status, D, M, and F scores with age status and OHL-AQ Score. So that in people with younger age or people with higher OHL score, the state of tooth decay and damage was less (**Table III**).

Table I: Comparison of OHL-AQ and DMFT Score according to demographic characteristics.

Variable		N (%)	OHL-AQ Score M(SD)	DMFT Score M(SD)
Gender	Man Woman	67 (47.9) 73 (52.1)	7.05 (1.67) 8.61 (2.87)	1.61 (0.86) 1.1 (0.99)
	P-value, F		**0.000, 32.3**	**0.33, 0.92**
Education	Under diploma Diploma University education	63 (45) 60 (42.9) 1712.1)	6.28 (1.15) 8.4 (1.83) 11.88 (2.91)	1.69 (0.83) 1.23 (0.92) 0.47 (0.94)
	P-value, F		**0.000, 73.69**	**0.000, 13.67**
Job	Have a job No job	28 (20) 112 (80)	7.21 (1.93) 8.03 (2.59)	1.6 (0.99) 1.28 (0.95)
	P-value, F		**0.12, 4.97**	**0.11, 0.11**
Income	Low Average Hight	72 (51.4) 64 (45.7) 4 (2.9)	7.7 (2.69) 8.06 (2.3) 7.75 (1.7)	1.27 (0.96) 1.42 (0.98) 1.5 (0.57)
	P-value, F		**0.7, 0.34**	**0.65, 0.42**
Place of living	City Village	35 (25) 105 (75)	7.68 (3.03) 7.93 (2.3)	1.48 (0.95) 1.3 (0.97)
	P-value, F		**0.04, 4.13**	**0.87, 0.026**
Frequency of brushing per day	<1 1 1-feb >2	33 (23.6) 65 (46.4) 31 (22.1) 11 (7.9)	6.48 (1.01) 7.4 (1.93) 9.25 (3.34) 10.9 (1.37)	1.72 (0.87) 1.5 (0.85) 0.87 (1.05) 0.63 (0.8)
	P-value, F		**0.000, 17.28**	**0.000, 7.78**
Dental visit	<6 months 6 months- 1 Years >1 Years	3 (2.1) 30 (21.4) 107 (76.4)	6.33 (0.57) 7.4 (2.29) 8.04 (2.56)	2 (0.0) 1.66 (0.95) 1.24 (0.95)
	P-value, F		**0.25, 1.37**	**0.05, 3.03**
Smoking	Yes No	17 (12.1) 123 (87.9)	6.82 (0.80) 8.01 (2.61)	1.94 (0.89) 1.26 (0.95)
	P-value, F		**0.000, 12.92**	**0.3 (1.05)**
Oral health self-assessment	I do not know Bad Good	61 (43.6) 58 (41.4) 21 (15)	7.73 (2.17) 7.75 (2.67) 8.57 (2.83)	1.34 (0.92) 1.37 (1.00) 1.28 (1.00)
	P-value, F		**0.38, 0.97**	**0.92, 0.07**

Table II: Comparison of OHL-AQ Score according to Oral health self-assessment.

Variable	N (%)	Oral health self-assessment		
		I do not know	Bad	Good
Unfavorable	101 (72.1)	47 (46.5)	40 (39.6)	14 (13.9)
Relatively favorable	23 (16.4)	10 (43.5)	12 (52.5)	1 (4.3)
Favorable	16 (11.4)	4 (25)	6 (37.5)	6 (37.5)
Total Score	140 (100)	101 (72.1)	23 (16.4)	16 (11.4)

Table III: Correlation of DMFT, D, M, and F scores with age status and OHL-AQ Score.

Variable	M(SD)	OHL-AQ Score		Age	
		Significance	Correlation (r)	Significance	Correlation (r)
D	0.52 (0.5)	0.000	0.46	0.000	0.51
M	0.49 (0.5)	0.000	0.39	0.000	0.3
F	0.33 (0.47)	0.000	0.25	0.000	0.22
DMF	1.35 (0.96)	0.000	0.57	0.000	0.53

Result showed, there was no relationship between the status of DMFT, D, M, and F scores with gender, but the Decayed & Missing rate was higher in smokers (**Table IV**).

Table III: Correlation of DMFT, D, M, and F scores with age status and OHL-AQ Score.

Variable	M(SD)	Gender			Smoking		
		Yes	No	P-value	Yes	No	P-value
D	0.52 (0.5)	0.53 (0.5)	0.5 (0.5)	0.54	0.82 (0.39)	0.47 (0.5)	0.000
M	0.49 (0.5)	0.59 (0.49)	0.39 (0.49)	0.89	0.7 (0.46)	0.46 (0.5)	0.000
F	0.33 (0.47)	0.47 (0.5)	0.2 (0.4)	0.000	0.41 (0.5)	0.32 (0.47)	0.26
DMF	1.35 (0.96)	1.61 (0.86)	1.1 (0.99)	0.33	1.94 (0.89)	1.26 (0.95)	0.3

Discussion

Considering the complications of chronic diseases and their negative effects on all dimensions of health, including mental and physical health, it is necessary to have OHL. In fact, considering the complications caused by MS disease, one of the important points in improving the health of these patients is to have proper health literacy in order to be able to manage the complications of the disease and prevent the recurrence of symptoms[25,26]. For this reason, this study was conducted with the aim of determining the health literacy of patients with MS.

According to the findings, most of the patients had a low health literacy score. In the study of Pooryaghob et al[27]., which examined the HL of MS patients in Iran (Qazvin city), 100 patients were included in the study using NVS and METER tools. According to the findings, in the NVS tool, the rate of insufficient HL was 63%, the rate of borderline HL was 26%, and the rate of sufficient HL was 11%. Also, according to the METER tool, the low HL rate was 7% and the high HL rate was 93%[27]. On the other hand, in the study of Marrie et al[28]. in the United States, 8934 patients with MS completed the NVS and METER questionnaires. According to the findings of the NVS tool, the level of sufficient HL was equal to 74.62%, and according to the METER tool, 81.4% of the patients had functional literacy[28], which is higher than the reported score results of this study. Among the causes of this difference, we can point out the difference in the type of tools used and the specialization of the surveys conducted in the field of health literacy in this study.

Various studies have investigated the prevalence of OHL in patients, and the obtained score of OHL in them has been reported differently. So, in the study of Amirchaghmaghi et al., among 380 patients of Mashhad dental clinic, M(Sd) OHL score was 10.6 (3.4) and 46.8% of patients had good health literacy[29]. Also, in the study of Sistani et al., in which 97 people were examined, inadequate OHL was reported as 39.2%, marginal OHL as 16.5%, and adequate OHL as 44.3%[22]. On the other hand, in the study of Blizniuk et al., who examined 281 adults, 68.7% of people had adequate OHL, 18.9% had marginal OHL,

and 12.4% had inadequate OHL[30]. Among the reasons for the low OHL score in this study compared to other studies, we can point to the difference in the research population. So, in this study, patients with MS have been examined, while in other studies, the clients of the dental clinic or healthy people have been examined.

Conclusion

The OHL-AQ score of patients with MS in this study was reported to be low. For this reason, it is recommended to design and implement an educational program to improve the health literacy of patients with MS, especially the health literacy related to oral and dental diseases in these patients.

Footnotes

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ORIGINAL

Valoración del hábito de salud psicológica en el estilo de vida saludable adquirido en adultos españoles de 22 a 72 años

Assessment of the psychological health habit in the determined healthy lifestyle in Spanish adults from 22 to 72 years of age

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Resumen

Los hábitos de salud psicológica constituyen uno de los factores predictores de salud principales dentro de los estilos de vida saludables. Realizamos un diseño descriptivo y transversal sobre una muestra incidental y aleatoria de 788 sujetos adultos de edades comprendidas entre los 22 y 72 años de edad y se aplicó la Escala de Valoración del Estilo de Vida Saludable Adquirido (E-VEVSA), analizando la dimensión que explica los hábitos de salud psicológica. Un 17,5% de los sujetos poseen hábitos de salud psicológica poco saludables, un 57,4% hábitos tendentes hacia la salud y tan sólo el 25,1% poseen hábitos saludables. Las pruebas de Chi-cuadrado de Pearson muestran una asociación positiva y significativa de los hombres con el nivel tendente hacia la salud, mientras que las mujeres se asocian al nivel poco saludable. Así mismo, con el transcurso de la edad se produce un aumento significativo del nivel del hábito de salud psicológica. Estas diferencias por sexo y edad son corroboradas con las pruebas estadísticas inferenciales (pruebas t-student y ANOVA de un factor). Es necesario promover programas preventivos de mejora de la salud psicológica en la población adulta que presenta niveles poco o nada saludables en su estilo de vida.

Palabras clave: Salud psicológica, estilo de vida, hábitos, valoración, adultos.

Abstract

Psychological health habits constitute one of the main health predictors within healthy lifestyles. We conduct a descriptive and cross-sectional design on an incidental and random sample of 788 adult subjects aged between 22 and 72 years of age. The health-related Lifestyle Assessment Scale (E-VEVSA) was implemented, analyzing the dimension that explains psychological health habits. 17.5% of the subjects have unhealthy psychological health habits, 57.4% have habits tending towards health and only 25.1% have healthy habits. Pearson's Chi-square tests show a positive and significant association of men with the level tending towards health, while women are associated with the low healthy level. Likewise, with the course of age there is a significant increase in the level of psychological health habits. These differences by sex and age are verified with inferential statistical tests (t-student tests and one-factor ANOVA). It is necessary to promote preventive programs to improve psychological health in the adult population that has low or unhealthy levels of lifestyle.

Key words: Psychological health, lifestyle, habits, assessment, adults.

Introducción

La salud es un constructo teórico que ha evolucionado de forma paralela al desarrollo cultural, político y económico de la sociedad[1-6,7,8,9]. En este sentido, los grandes avances científicos experimentados en la psiquiatría y neurobiología del siglo XIX produjeron cambios en dicho concepto y destacaron con gran relevancia los aspectos mentales y sociales de la salud en contraste con la concepción higienista presente en etapas anteriores provocada por las epidemias y enfermedades por contagio de origen bacteriano[10,11,12,13].

Con la revolución industrial se produjo un gran avance de la medicina preventiva y el advenimiento de una concepción bio-psico-social de la salud que haría cambiar la concepción como ausencia de enfermedad, para centrar su atención en la persona en su globalidad y enfocarse hacia un concepto holístico de salud[14].

Sin embargo, tal y como afirma Fernández Liria[15], en los años ochenta, las referencias a la salud o los trastornos mentales fuera de los ámbitos especializados pasaron a ser meramente marginales. La atención a la salud mental dejó de ser considerada un desafío para el estado del bienestar y pasó a ser observada únicamente como un potencial mercado en el que la industria podría realizar beneficios.

En cuanto al concepto de salud mental, Lopera[16] constata que se ha investigado muy poco desde que en 1950 la Organización Mundial de la Salud[5] propusiera su definición a partir de la ausencia de trastornos mentales resaltando la importancia de las condiciones de vida (determinantes sociales en salud), el enfoque de derechos y el tratamiento y la prevención de los trastornos mentales. Desde una perspectiva transcultural es casi imposible llegar a una definición exhaustiva de la salud mental. Se admite, no obstante, que el concepto de salud mental es más amplio que la ausencia de trastornos mentales[2]. En este sentido, los aspectos preventivos y la importancia de los hábitos y los estilos de vida no se tienen muy en cuenta para fundamentar la creación de políticas públicas en salud.

Según Lopera[16], dos movimientos surgidos en Europa, principalmente en Francia, acentuaron sus críticas al modelo médico de enfermedad psiquiátrica; movimientos conocidos como *Psicoterapia Institucional y Política del Sector en Psiquiatría.* Se fomenta una profunda crítica y se sientan las bases para distinguir los conceptos de salud e higiene mentales. Citando a Campos[17] se dio una mezcla entre el deseo de curar y ayudar a disminuir las dolencias psíquicas, y un intento de controlar las conductas y extender el poder psiquiátrico a todas las esferas de la sociedad.

La importancia de la salud mental en los últimos años ha alcanzado una gran transcendencia en las sociedades más avanzadas[5,6]. Los grandes avances tecnológicos y el triunfo de una sociedad del bienestar han provocado grandes cambios en el comportamiento del ser humano y la proliferación de un ritmo de vida acelerado donde reina el estrés y se ha generado un crecimiento exponencial de alteraciones psicológicas y enfermedades mentales, entre las que destacan los estados de ansiedad y la depresión[18,19,20].

La investigación ha evidenciado una creciente somatización de los problemas psicológicos, que hoy en día se traducen en enfermedades del sistema cardiovascular, del aparato digestivo, alteraciones del sueño y del comportamiento, así como la presencia de estados carenciales, ausencia de vitalidad y sensación constante de infelicidad[21,22,23].

En este sentido, los hábitos de salud psicológica están considerados como unos de los factores predictores principales que conforman los denominados estilos de vida saludables[24,25]. Cuando el hábito de salud psicológica se consolida en el comportamiento habitual de un sujeto decimos que forma parte de su estilo de vida saludable adquirido[26,27].

El hábito de salud psicológica que se incorpora al estilo de vida puede generar beneficios para la salud o, por el contrario, amenazas para la vida futura de un sujeto. Según sea la orientación de dichos hábitos, el estilo de vida se va a convertir en uno de los principales predictores para que la salud adquiera una tendencia positiva o negativa[28,29,30].

En los últimos años, la investigación ha constatado un incremento de las alteraciones de la salud mental, evidenciadas sobre todo en la presencia hospitalaria y en las consultas médicas por problemas de estrés, ansiedad y depresión, con un incremento del empleo de fármacos ansiolíticos y antidepresivos. Esta proliferación de la morbilidad en la salud mental se puede verificar a lo largo de todo el territorio español[31], en la mayoría de los países europeos[32], aumentando su problemática en el ámbito de América latina[33] y en diversas investigaciones que utilizan escalas para la valoración del estilo de vida en población adulta[34-36,37;38;39,40].

Conocer el estilo de vida nos puede orientar a la hora de establecer modificaciones en las conductas de los sujetos que vayan encaminadas a mejorar la salud. Desde esta perspectiva, va a ser fundamental poder evaluar y determinar el nivel de los hábitos de salud psicológica dentro del estilo de vida, ya que, de este modo, podremos reafirmar determinados hábitos positivos y/o redirigir otros hacia modelos tendentes hacia la salud.

Es por ello, que el objetivo de la presente investigación se ha centrado en evaluar los hábitos de salud psicológica dentro del estilo de vida saludable adquirido

por adultos españoles de edades comprendidas entre 22 y 72 años, utilizando un cuestionario de evaluación denominado *"Escala de Evaluación del Estilo de Vida Saludable Adquirido (E-VEVSA)"*, formado por 52 items y 7 dimensiones, entre las cuales se encuentran el factor n.º 6, denominado *"Hábitos de salud psicológica"*.

Material y métodos

Participantes. Fue seleccionada una muestra incidental y aleatoria de 788 sujetos adultos (49,5% hombres y 50,5% mujeres) de edades comprendidas entre los 22 y 77 años. La selección de los participantes se realizó mediante muestreo no probabilístico, aleatorio e intencional.

Instrumento. Fue utilizada la *"Escala de Valoración del Estilo de Vida Saludable Adquirido"* (E-VEVSA) (**Tabla VIII**), que fue administrada por médicos de familia en centros de atención primaria de la Comunidad de Castilla-La Mancha (España) y Comunidad de Murcia (España). Dicha escala está formada por 52 items estructurados en 7 dimensiones: 1. Responsabilidad individual en el cuidado de la salud, 2. Hábito de práctica físico-deportiva, 3. Hábitos de salud en las relaciones sociales, 4. Hábito de consumo de tabaco, alcohol y otras drogas, 5. Hábitos de alimentación saludable, 6. Hábitos de salud psicológica y 7. Hábitos de sueño y descanso diario. Las pruebas psicométricas exploratorias y confirmatorias realizadas arrojan una fiabilidad global de la escala en la prueba alfa (α) de Crombach de .848 y explican una varianza total del 67.84%. Seis de los items de la escala global se agruparon formando la dimensión o subconstructo nº 6 (Hábitos de salud psicológica), que explicó una varianza parcial de 8,195% y un α de Crombach de .742.

Toda la investigación se realizó siguiendo las normas deontológicas reconocidas por la Declaración de Helsinki (revisión de 2008) y siguiendo las recomendaciones de Buena Práctica Clínica de la CEE (documento (111/3976/88 de julio de 1990) y la normativa legal vigente española que regula la investigación clínica en humanos (Real decreto 561/1993 sobre ensayos clínicos). Todos los sujetos firmaron un consentimiento informado donde se les garantizó el completo anonimato a la hora de realizar el tratamiento de los datos. Así mismo, para la selección de los participantes fueron determinados como criterios de exclusión: no tener una edad inferior a 20 años, ya que, por encima de este límite, nos aseguramos una mayor estabilidad de los hábitos adquiridos por los sujetos, no sufrir graves patologías diagnosticadas, por lo que no se incluyeron sujetos con patologías orgánicas de media o severa gravedad, tanto físicas como mentales. Así mismo, fueron descartados aquellos sujetos que dejaban sin contestar más de dos ítems del cuestionario y, a su vez, determinamos de forma consensuada, que los datos

perdidos serían reemplazados por los valores medios de las puntuaciones de los items.

Puntuaciones. La puntuación máxima posible en la escala era de 260 y la mínima de 52. Así mismo, la puntuación mínima para el factor nº 6 *"Hábitos de salud psicológica"* fue de 6 y la máxima de 30. Los items se redactaron variando las codificaciones positivas y negativas con relación al estilo de vida y, aunque la forma de respuesta siempre se ordenaba con las modalidades de 1 a 5 (1: nunca; 2: casi nunca; 3: a veces; 4: con bastante frecuencia; 5: con mucha frecuencia), unos items puntuaban de 1 a 5 y otros de 5 a 1 según fuese su orientación positiva o negativa para la salud. Dichas puntuaciones serían recodificadas tras introducir los datos para su análisis mediante el programa informático SPSS versión 28.

El nivel de clasificación del hábito de salud psicológica se calculó dividiendo en 4 intervalos la diferencia entre la puntuación máxima (30) y la mínima (6), siendo nada saludable: 6-12; poco saludable: 12,01-18; tendente hacia la salud: 18,01-24; saludable: 24,01-30.

Resultados

Resultados descriptivos y relacionales
En la **tabla I** observamos los datos de fiabilidad (α de Crombach) de los items, la fiabilidad global y varianza parcial explicada por el factor y los descriptivos correspondientes a las puntuaciones obtenidas en cada uno de los items que definen el factor de *Hábitos de Salud Psicológica* en la escala E-VEVSA. La media de todos los items del factor (mínimo=1; máximo=5) fue de 3,65±0,97 (3,73±0,92 en varones y 3,57±1,01 en mujeres). En la suma global del factor nos encontramos una media de 21,91±3,63 (22,37±3,28 en varones y 21,46±3,89 en mujeres).

Los resultados descriptivos correspondientes a los 6 items que conformaban el factor n.º 6 sobre los hábitos de salud psicológica los podemos ver en la **tabla II**. Observamos que el 84,7% de toda la muestra nunca, casi nunca o con poca frecuencia manifiestan tener problemas de salud psicológica (88,17% de varones y 81,4% de mujeres), mientras que el 15,21% presentan problemas con bastante frecuencia (11,83% de varones y 18,6% de mujeres).

En la **tabla III** podemos ver la matriz de correlaciones entre los 6 items que conforman el factor n.º 6 *"Hábitos de salud psicológica"*. Aunque todos los valores son aceptables (mayores que 0,3) y significativos (p<0,01), destacamos que entre los items 10 y 18 que hacen referencia a estados alterados, de ansiedad y estrés el valor r de Pearson es el más elevado (r=0,702; p<0,01); igualmente, encontramos valores altos entre los items 7 y 21 (r=0,630; p<0,01) que explican conceptualmente situaciones de bajo ánimo para hacer las tareas diarias.

Tabla I: Descritivos correspondientes a los items del factor "Hábitos de salud psicológica".

	N	α de Crombach si se elimina(A)	Mínimo	Máximo	Media(B)	Desv. típ.
(7) Tener pereza y sentir agotamiento al levantarme cada mañana	788	0,6	1	5	3,47	1,02
(10) Alterarme por sucesos de escasa relevancia	788	,604	1	5	3,72	0,9
(16) Obsesionarme por el cuidado de mi salud y las enfermedades	788	,640	1	5	3,83	1
(18) Estar ansioso y estresado	788	,603	1	5	3,36	0,96
(21) Estar con poco ánimo para realizar las tareas cotidianas o laborales	788	,567	1	5	3,76	0,94
(29) Tener muy baja autoestima	788	,583	1	5	3,77	1,02
TOTAL FACTOR(C): Hábito de salud psicológica	788	0,74	13	30	21,91	3,63

(A) La subescala de hábitos de salud psicológica obtuvo un alfa de Crombach parcial de .742 y una varianza parcial explicada del 8,195%.
(B)La media de las puntuaciones (1-5) fue de 3,65±0,97 (3,73±0,92 en varones y 3,57±1,01 en mujeres). En la suma global del factor nos encontramos una media de 21,91±3,63 (22,37±3,28 en varones y 21,46±3,89 en mujeres).
(C)La suma de las puntuaciones en cada item determina el total oibtenido en la dimensión. La modalidad de puntuación oscila entre 1 y 5, por lo que el rango de puntuaciones está entre el intervalo 6-30.

Tabla II: Descriptivos en función del sexo correspondientes a los items sobre hábitos de salud psicológica en la escala E-VEVSA.

	N	Nunca	Casi nunca	Con poca frecuencia	Con bastante frecuencia	Con mucha frecuencia
HOMBRES						
(7) Tener pereza y sentir agotamiento al levantarme cada mañana	390 21,80%	85 30,80%	120 28,70%	112 18,70%	73 0%	0
(10) Alterarme por sucesos de escasa relevancia	390 24,40%	95 49%	191 19,70%	77 6,90%	27 0%	0
(16) Obsesionarme por el cuidado de mi salud y las enfermedades	390 31,3	122 33,30%	130 22,60%	88 12,80%	50 0%	0
(18) Estar ansioso y estresado	390 11%	43 37,40%	146 35,10%	137 16,40%	74 0%	0
(21) Estar con poco ánimo para realizar las tareas cotidianas o laborales	390 18,20%	71 43,80%	171 29,50%	115 8,50%	33 0%	0
(29) Tener muy baja autoestima	390 32,60%	127 36,20%	141 23,60%	92 7,70%	30 0%	0
MUJERES						
(7) Tener pereza y sentir agotamiento al levantarme cada mañana	398 14,10%	56 36,40%	145 24,10%	96 25,40%	101 0%	0
(10) Alterarme por sucesos de escasa relevancia	398 17,3	69 31,70%	126 37,40%	149 13,60%	54 0%	0
(16) Obsesionarme por el cuidado de mi salud y las enfermedades	398 29,10%	116 37,90%	151 19,80%	79 13,10%	52 0%	0
(18) Estar ansioso y estresado	398 15,30%	61 25,40%	101 32,7	130 26,60%	106 0%	0
(21) Estar con poco ánimo para realizar las tareas cotidianas o laborales	398 31,90%	127 29,60%	118 25,60%	102 12,80%	51 0%	0
(29) Tener muy baja autoestima	398 27,90%	111 25,90%	103 26,10%	104 20,10%	80 0%	0

GLOBAL: 84,7% (nunca, casi nunca o con poca frecuencia) y 15,21% (con bastante frecuencia).
HOMBRES: 88,17% (nunca, casi nunca o con poca frecuencia) y 11,83% (con bastante frecuencia);
MUJERES: 81,4% (nunca, casi nunca, o con poca frecuencia) y 18,6% (con bastante frecuencia).

Tabla III: Correlaciones establecidas entre los items sobre hábitos de salud psicológica.

		7	10	16	18	21	29
7	r de Pearson		,408(**)	,450(**)	,404(**)	,630(**)	,486(**)
	p valor		,000	,008	,000	,000	,003
10	r de Pearson	,408(**)		,427(**)	,648(**)	,522(**)	,598(**)
	p valor	,000		,003	,000	,000	,000
16	r de Pearson	,450(**)	,427(**)		,552(**)	,455(**)	,402(**)
	p valor	,008	,003		,000	,000	,001
18	r de Pearson	,404(**)	,648(**)	,552(**)		,574(**)	,579(**)
	p valor	,000	,000	,000		,000	,000
21	r de Pearson	,630(**)	,522(**)	,455(**)	,574(**)		,499(**)
	p valor	,000	,000	,000	,000		,000
29	r de Pearson	,486(**)	,598(**)	,402(**)	,579(**)	,499(**)	
	p valor	,003	,000	,001	,000	,000	

** La correlación es significativa al nivel 0,01 (bilateral). * La correlación es significante al nivel 0,05 (bilateral).

La tabla de contingencias con la prueba de Chi-cuadrado (χ^2) de Pearson y análisis de residuos tipificados corregidos que relaciona el nivel en los hábitos de salud psicológica y el sexo (**Tabla IV**), nos indica una asociación positiva y significativa (p<0.005) de los varones con el nivel de clasificación tendente hacia la salud, indicando un residuo tipificado corregido (rtc)= 3,1, mientras que las mujeres se asocian positiva y significativamente al nivel del hábito nada saludable (rtc=5,1). Según el intervalo de puntuaciones asignados para clasificar el nivel de salud en los hábitos de salud psicológica, podemos observar que la muestra analizada se distribuye de la siguiente manera: el 17,5% poseen hábitos poco saludables, el 57,4% tendentes hacia la salud y un 25,1% presentan un comportamiento saludable.

En la **tabla V** observamos que, conforme avanzamos en las diferentes franjas de edad se establece una asociación positiva y significativa en el nivel de los hábitos de salud psicológica (p<0.005), de tal forma que, mientras en la etapa de 41-48 años los residuos tipificados corregidos nos indican una asociación positiva y significativa hacia hábitos poco saludables de salud psicológica, en las franjas posteriores entre 49 y 55 y 56 y 72 los residuos tipificados corregidos nos indican una asociación positiva y significativa (p<0.005) hacia la salud de dichos hábitos (rtc=3,2 y rtc=2,6 respectivamente).

Tabla IV: Tabla de contingencias que relaciona el nivel de los hábitos de salud psicológica con el sexo.

			Niveles (nada, poco, tendente, saludable)			
			Hábito poco saludable	Hábito tendente hacia la salud	Hábito saludable	Total
Sexo	Hombre	Recuento % de Sexo % del total Residuos corregidos	41 10,5% 5,2% -5,1	245 62,8% 31,1% 3,1	104 26,7% 13,2% 1,0	390 100,0% 49,5%
	Mujer	Recuento % de Sexo % del total Residuos corregidos	97 24,4% 12,3% 5,1	207 52,0% 26,3% -3,1	94 23,6% 11,9% -1,0	398 100,0% 50,5%
	Total	Recuento % de Sexo % del total	138 17,5% 17,5%	452 57,4% 57,4%	198 25,1% 25,1%	788 100,0% 100,0%

χ^2 de Pearson= 26,34; p<0.0005
0 casillas (0%) poseen frecuencias esperadas inferiores a 5.
(A)Nivel de clasificación del hábito de práctica físico-deportiva: nada saludable (6-12); poco saludable (12,01-18); tendente hacia la salud (18,01-24); saludable (24,01-30)

Tabla V: Tabla de contingencias que relaciona el nivel de los hábitos de salud psicológica con la edad.

			Niveles (nada, poco, tendente, saludable)			
			Hábito poco saludable	Hábito tendente hacia la salud	Hábito saludable	Total
Edad	20-40	Recuento % de Edad % del total Residuos corregidos	39 19,6% 4,9% ,9	131 65,8% 16,6% 2,8	29 14,6% 3,7% -4,0	199 100,0% 25,3%
	41-48	Recuento % de Edad % del total Residuos corregidos	52 23,9% 6,6% 2,9	120 55,0% 15,2% -,8	46 21,1% 5,8% -1,6	218 100,0% 27,7%
	49-55	Recuento % de Edad % del total Residuos corregidos	16 7,6% 2,0% -4,4	124 59,0% 15,7% ,6	70 33,3% 8,9% 3,2	210 100,0% 26,6%
	56-72	Recuento % de Edad % del total Residuos corregidos	31 19,3% 3,9% ,7	77 47,8% 9,8% -2,7	53 32,9% 6,7% 2,6	161 100,0% 20,4%
	Total	Recuento % de Edad % del total	138 17,5% 17,5%	452 57,4% 57,4%	198 25,1% 25,1%	788 100,0% 100,0%

χ^2 de Pearson= 10,09; p>0.05
0 caillas (0%) poseen frecuencias esperadas inferiores a 5.
(A)Nivel de clasificación del hábito de salud psicológica: nada saludable (6-12); poco saludable (12,01-18); tendente hacia la salud (18,01-24); saludable (24,01-30).

Resultados inferenciales

La prueba t-student para muestras independientes (**Tabla VI**), a excepción de los items 16 *"Obsesionarme por el cuidado de mi salud y las enfermedades"* y 21 *"Estar con poco ánimo para realizar las tareas cotidianas o laborales"*, en el resto de los items y en la puntuación global de los hábitos de salud psicológica encontramos encontramos que los varones presentan medias significativamente más altas (p<0.05) que las mujeres.

En el modelo lineal general (ANOVA) que relaciona las puntuaciones obtenidas en el global del factor de hábitos de práctica físico-deportiva con los diferentes tramos de edad, observamos que se produce un incremento significativo (p<0.0005) del nivel del hábito de salud psicológica con el transcurso de la edad, encontrando las medias más elevadas en los dos últimos tramos de edad (49-55 y 56-72) (**Tabla VII**).

Tabla VI: Prueba t-student para muestras independientes de las diferencias de las medias en las puntuaciones de los items del factor "Hábitos de salud psicológica" en función del sexo.

		Prueba de Levene		Prueba T para la igualdad de medias para la igualdad de varianzas		
		F		t	Sig. (bilateral)	Diferencia de medias
(7) Tener pereza y sentir agotamiento al levantarme cada mañana	Se han asumido varianzas iguales No se han asumido varianzas iguales	,037	,847	2,258 2,258	,024 ,024	,164 ,164
(10) Alterarme por sucesos de escasa relevancia	Se han asumido varianzas iguales No se han asumido varianzas iguales	25,811	,000	5,997 6,003	,000 ,000	,380 ,380
(16) Obsesionarme por el cuidado de mi salud y las enfermedades	Se han asumido varianzas iguales No se han asumido varianzas iguales	,776	,379	-,012 -,012	,990 ,990	-,001 -,001
(18) Estar ansioso y estresado	Se han asumido varianzas iguales No se han asumido varianzas iguales	9,979	,002	1,997 2,000	,046 ,046	,137 ,137
(21) Estar con poco ánimo para realizar las tareas cotidianas o laborales	Se han asumido varianzas iguales No se han asumido varianzas iguales	20,327	,000	-1,313 -1,315	,190 ,189	-,089 -,089
(29) Tener muy baja autoestima	Se han asumido varianzas iguales No se han asumido varianzas iguales	36,979	,000	4,419 4,426	,000 ,000	,320 ,320
FACTOR: Hábito de salud psicológica	Se han asumido varianzas iguales No se han asumido varianzas iguales	9,551	,002	3,553 3,559	,000 ,000	,91215 ,91215

Media de puntuaciones (Hombre-Mujer): (7): 3,56-3,39; (10): 3,91-3,53; (16): 3,83-3,83; (18): 3,43-3,29; (21): 3,72-3,81; (29): 3,94-3,72;TOTAL FACTOR: 22,37-21,46En

Tabla VII: ANOVA de un factor que analiza las diferencias en las puntuaciones de los hábitos de salud psicológica en función de las franjas de edad.

Variable dependiente: Hábito de salud psicológica DMS						
					Intervalo de confianza al 95%.	
(1) Edad	(2) Edad	Diferencia entre medias (1-2)	Error típ.	Significación	Límite inferior	Límite superior
20-40	41-48 49-55 56-72	-,3323 -2,2563(*) -1,4729(*)	,34499 ,34811 ,37299	,336 ,000 ,000	-1,0095 -2,9397 -2,2051	,3449 -1,5730 -,7407
41-48	20-40 49-55 56-72	,3323 -1,9241(*) -1,1406(*)	,34499 ,34023 ,36565	,336 ,000 ,002	-,3449 -2,5919 -1,8584	1,0095 -1,2562 -,4229
49-55	20-40 41-48 56-72	2,2563(*) 1,9241(*) ,7834(*)	,34811 ,34023 ,36860	,000 ,000 ,034	1,5730 1,2562 ,0599	2,9397 2,5919 1,5070
56-72	20-40 41-48 49-55	1,4729(*) 1,1406(*) -,7834(*)	,37299 ,36565 ,36860	,000 ,002 ,034	,7407 ,4229 -1,5070	2,2051 1,8584 -,0599

* La diferencia de medias es significativa al nivel ,05.
Basado en las medias observadas.
22-40: (20,92±2,91); 41-48: (21,25±3,79) 49-55 (23,18±3,39); 56-72: (22,39±3,93)
Potencia observada: 1,00
F=17,86; p<0,0005
a Calculado con alfa = ,05
b R cuadrado = ,064 (R cuadrado corregida = ,060).

Discusión

En nuestra investigación hemos encontrado que un 17,5% de los sujetos poseen hábitos de salud psicológica poco saludables, un 57,4% hábitos tendentes hacia la salud y tan sólo una cuarta parte (25,1%) poseen hábitos saludables. Así mismo, encontramos una asociación positiva y significativa (χ^2=26,34; p<0.0005) en los varones de los hábitos de salud psicológica hacia el nivel tendente hacia la salud, mientras que, en el caso de las mujeres, los residuos tipificados corregidos (rtc=5,1) las asocian significativamente a los hábitos de salud psicológica en un nivel poco saludable. Así mismo, las tablas de contingencia nos indican cómo con el transcurso de la edad se produce un aumento significativo del nivel de salud en los hábitos de salud psicológica (χ^2 de Pearson= 10,09; p>0.05). Estas diferencias en función del sexo y la edad son corroboradas en los resultados inferenciales, de tal forma que, en la prueba t-student, los varones presentan medias significativamente más altas en todos los items y en la media global del factor n.º 6 *"Hábitos de salud psicológica"*, con excepción de los items 16 *"Obsesionarme por el cuidado de mi salud y las enfermedades"* y 21 *"Estar con poco ánimo para realizar las tareas cotidianas o laborales"*, donde no hay diferencias entre varones y mujeres. Así mismo, en el análisis de varianza efectuado (ANOVA de un factor) observamos, con independencia del sexo, que se produce un aumento significativo en las medias de las puntuaciones con el transcurso de la edad, con excepción del paso del primer tramo (20-40) al segundo (41-48) y del tercero (49-55) al cuarto (56-72), encontrando las medias de puntuaciones más elevadas en el tercer y cuarto tramo de edad. Un dato muy relevante de nuestro estudio revela que el 22,8% de la muestra manifiesta estar ansioso y estresado con bastante frecuencia.

El factor que define los hábitos de práctica físico-deportiva en nuestra escala E-VEVSA está formado por 6 items. El análisis de las correlaciones establecidas entre dichos items nos permiten interpretar cómo se agrupan los mismos. Encontramos un valor r de Pearson alto y significativo (r= ,702; p<0.01) entre los items 10 y 18, que hacen referencia conceptualmente a estados alterados, de ansiedad y estrés. Por otro lado, los valores de r de Pearson son también elevados entre los items 7, 21 y 29, que hacen referencia a situaciones de baja autoestima y poco ánimo para hacer las tareas diarias. Sobre todo, la correlación más fuerte se da entre los items 7 y 21 (r= ,630; p<0.01). Los datos de correlación más bajos los encontramos entre el item 16 y los demás, circunstancia que parece alejarle conceptualmente de las dos agrupaciones de items anteriores. Aun así, todas las correlaciones han resultado significativas al 99% de probabilidad (p<0,01).

Hemos encontrado resultados similares a los registrados con nuestra escala E-VEVSA en relación con el nivel en los hábitos de salud psicológica en diversas investigaciones. En este sentido, Henares et al[31], nos ofrecen datos relativos a la evolución de la salud psicológica en adultos recogida en la Encuesta Nacional de Salud Pública de España en los años 2006, 2011 y 2017. Sánchez Lopez et al[45] realizan un diseño transversal, estratificado y polietápico con encuestas independientes por comunidades autónomas. Utilizaron el llamado *"General Health Questionnaire (GHQ-12)"* creado y validado por Golber[41] y traducido y adaptado a población española por[42] y observan que la morbilidad psíquica global en España fue del 22,2% en 2006, el 22,1% en 2011 y el 19,1% en 2017. Al igual que en nuestro estudio, la frecuencia de morbilidad psíquica fue mayor en las mujeres que en los hombres. Así mismo, destacan la presencia de una mala salud psicológica autopercibida del 15,4% en los hombres y del 33,6% en las mujeres. Los autores destacan que la media global en la prescripción de tranquilizantes fue del 9,2%, destacando con la frecuencia más alta Galicia (global 20,1%, hombres 12,6%, mujeres 26,0%) y con las más bajas Cantabria (global 10,2%, hombres 4,1%). La mayor frecuencia de prescripción se observó en mujeres en todas las comunidades, destacando Aragón, donde la prescripción de tranquilizantes en las mujeres fue más de tres veces mayor que en los hombres (20,1% vs. 5,5%). En cuanto a los antidepresivos, la media en España se situó en el 3,6%, siendo los datos más elevados significativamente en el caso de las mujeres.

Al igual que en España, los datos en el resto de Europa son bastante preocupantes, tal y como se refleja en último informe llamado *"Health at a Glance: Europe 2019"* sobre el panorama de salud en Europa publicado en noviembre de 2019 por la Comisión Europea y la Organización para la Cooperación y el Desarrollo Económico[6]. Este documento presenta análisis comparativos del estado de salud de los ciudadanos de la Unión Europea y el rendimiento de los sistemas sanitarios de sus Estados miembros, con el fin de identificar los puntos fuertes y las oportunidades de mejora. Un estilo de vida poco saludable (especialmente debido al tabaquismo, el consumo excesivo de alcohol y la obesidad) se erige como la causa principal de muchas enfermedades crónicas, entre ellas problemas psicológicos como una baja autoestima y la depresión. Nuestros resultados en E-VEVSA indican que un 7,7% de los adultos manifiestan tener una baja autoestima con bastante frecuencia, circunstancia por la cual, la OCDE expone la necesidad de incorporar psicólogos clínicos en los centros de Atención Primaria, dado que entre un 30-33% de las consultas están relacionadas con algún problema psicológico. En Europa, según la OCDE, aproximadamente una de cada cinco personas experimenta un problema de salud mental en un año determinado, mientras que una de cada dos desarrollará un problema de esta índole a lo largo de su vida. Nuestros resultados señalan un porcentaje más elevado de problemas de ansiedad y estrés (16,4% con bastante

frecuencia), mientras que la OCDE establece que los problemas más comunes en este ámbito de la salud son el trastorno de ansiedad (5,1% de la población), seguido de los trastornos depresivos (4,5%) y los trastornos por consumo de drogas y alcohol (2,9%).

La situación en América Latina es bastante más alarmante que la reflejada en nuestros hallazgos y en el conjunto de Europa. En este sentido, Alarcón[33] recoge los estudios epidemiológicos por la base de datos LILACS (Literatura Latinoamericana y del Caribe en Ciencias de la Salud) entre 1999 y 2008. La lista cubre un total de seis países (Brasil, Chile, México, Perú, Colombia y Uruguay) y analiza estudios transversales (centrados en temas tales como violencia doméstica, depresión o consumo de alcohol, tabaco y drogas). La prevalencia general de enfermedades mentales oscila entre 18% y 36%, la de depresión entre 9% y 27%, las psicosis afectivas entre 4% y 8%, y la ansiedad generalizada entre 1,3% y 5,3 %.

Igual que en el diseño de nuestra investigación con la escala E-VEVSA, encontramos otros instrumentos que valoran el estilo de vida en adultos y, dentro del mismo, los hábitos de salud psicológica o dimensiones similares. Uno de los instrumentos que responde a este perfil conceptual es el desarrollado por Walker et al.[33] llamado *Health-Promoting Lifestyle Profile* (HPLP). Es una escala de medida del estilo de vida constituida por 48 items distribuidos en 6 dimensiones: Autoactualización, Responsabilidad en Salud, Ejercicio Físico, Nutrición, Soporte interpersonal y Manejo del Estrés que, en el caso de E-VEVSA, se corresponde con los hábitos de salud psicológica. El HPLP fue adaptado a población hispana adulta por Walker et al.[32-34]. Posteriormente, Walker y Hill-Polerecky[34] realizaron una revisión de las dimensiones del instrumento HPLP y, basándose en la congruencia de las investigaciones sobre el constructo teórico del estilo de vida, modificaron tres de los factores iniciales. Este nuevo instrumento fue denominado bajo el nombre de *HPLP II*, que quedó conformado por un total de 52 items y 6 dimensiones o factores. Coincidimos con Walker y Hill-Polerecky[33] que los factores que definen el estilo de vida pueden ser divididos en dos dimensiones conceptuales. Por un lado, los factores referidos a comportamientos promotores de salud física, en el caso de E-VEVSA: Responsabilidad en el cuidado de la salud, hábitos de alimentación, hábitos de práctica de ejercicio físico, hábitos de sueño y descanso y hábitos de consumo de tabaco y alcohol y, por otro lado, factores referidos al bienestar cognitivo y emocional, como son los hábitos de salud psicológica y hábitos de salud social.

Utilizando la versión en español del HPLP-II[32-34], Vidal Gutiérrez et al.[38] evaluaron el estilo de vida en una muestra de 441 adultos chilenos, de ambos sexos, entre 20 y 65 años. Como en nuestros resultados en E-VEVSA, los autores encuentran diferencias significativas (p<0.05) entre hombres y mujeres en la dimensión manejo de estrés, crecimiento espiritual y actividad física. Concretamente, en la dimensión de manejo del estrés, los autores encuentran una media más baja que en nuestros resultados: 2,46±0,52 (2,57±0,46 en varones y 2,36±0,58 en mujeres; p<0.01) frente a 3,65±0,97 (3,73±0,92 en varones y 3,57±1,01 en mujeres; p<0.0005).

Por su parte, Insfrán Falcón et al.[39] valoraron el estilo de vida relacionado con el sobrepeso y la obesidad en una muestra de 75 sujetos con edades comprendidas entre 18 y 60 años utilizando una escala creada por Pardo et al.[41] que consta de 5 dimensiones coincidentes con la mayoría de las incluidas en E-VEVSA. Los autores obtienen resultados de salud del estilo de vida similares a los registrados en nuestra escala, ya que manifiestan que un 68% de los sujetos necesitan cambios para mejorar, mientras que tan sólo un 32% posee un estilo de vida saludable. En los sujetos que necesitaban cambios en el estilo de vida, se encontró que el 69,7% presentaba ansiedad y el 75% depresión, circunstancia que denota la gran influencia que la dimensión de los hábitos de salud psicológica posee en el estilo de vida y en la salud general.

Carranco Madrid et al.[40] realizan un programa para la mejora de la salud y analizan el nivel estilo de vida en una muestra de 35 trabajadores de México de edades comprendidas entre 22 y 61 años. Los autores analizan 6 dimensiones del estilo de vida (actividad física, recreación, autocuidado, hábitos alimenticios, consumo de sustancia psicoactivas y sueño) y encuentran en esta muestra niveles inferiores en salud que los registrados en E-VEVSA, de tal forma que un 76,6% tienen un estilo de vida poco o nada saludable, mientras que el resto (23,4%) se podría considerar adecuado desde el punto de vista de la salud. En relación con el análisis de la dimensión sobre consumo de sustancias psicotrópicas, el 54,3% entrega respuestas que conducen a pensar que tienen un estilo de vida saludable, frente al 42,9% de personas que refieren tener un nivel de vida poco saludable y, sólo el 2,9% da una versión que conduce a asumir que tiene un estilo de vida no saludable.

Un mayor paralelismo con nuestros datos arroja Ramírez-Vélez & Agredo[37] en una investigación con 550 adultos colombianos mayores de 18 años. Utilizaron el instrumento llamado *"FANTÁSTICO"*, para medir el estilo de vida, siguiendo el protocolo de adaptación y validez del cuestionario original[44]. El instrumento consta de 25 items agrupados en 10 dominios que tienen una gran similitud con la estructura factorial de la escala E-VEVSA. Entre los factores analizados encontramos el análisis del sueño y el estrés, donde los autores encuentran una media similar a nuestros resultados teniendo en cuenta que los valores mínimo y máximo oscilan entre 1 y 10, mientras que en E-VEVSA se sitúan entre 1 y 5. Por tanto, la media global en la dimensión de estrés fue de 5,3±0,9 (5,4±0,8 en varones y 5,2±1 en mujeres).

Triviño et al.[41] al analizar el estilo de vida en una muestra de 147 adultos colombianos utilizando el mismo instrumento de medida (*Fantástico*) que los autores anteriores, encuentran la existencia de correlaciones significativas y positivas entre las bajas puntuaciones en la dimensión de sueño y estrés con elevados niveles de glucemia, colesterol y triglicéridos en sangre, más elevadas en varones que en mujeres (p<0.01)., circunstancia que demuestra la incidencia que los problemas de salud mental poseen sobre variables de naturaleza fisiológica o clínica.

Mejorar el estilo de vida con el transcurso de la edad es importante, circunstancia que confirman Li et al.[46-48] al analizar la Encuesta de Longevidad Saludable Longitudinal China (CLHLS) de 2014 para identificar los estilos de vida de salud predominantes entre los ancianos chinos de 85 a 105 años. Los hallazgos mostraron que los comportamientos de estilo de vida saludable estimularon los sentimientos positivos de los ancianos chinos y condujeron a una mejor evaluación del bienestar subjetivo. Por el contrario, los comportamientos de estilo de vida menos saludables pueden ser un predictor de sentimientos negativos. Es importante integrar opciones de estilo de vida saludable para promover el bienestar psicológico de los ancianos.

Conclusiones

Hemos podido comprobar cómo la salud mental constituye uno de los hábitos más importantes que definen y conforman los estilos de vida en la población adulta. A su vez, la mayoría de investigaciones nacionales e internacionales señalan un incremento progresivo de los problemas y de la morbilidad psicológica en la población, sobre todo de los estados de estrés, ansiedad y depresión[49]. Es muy importante poder controlar la situación y el estado de la población y utilizar instrumentos que permitan un control de los hábitos de salud psicológica, tanto de forma individual como grupal. De este modo, una vez determinado el nivel de salud psicológica dentro del estilo de vida, es fundamental poder aplicar programas de mejora del comportamiento en aquellos casos en los cuales las puntuaciones de salud sean bajas y exista riesgo de padecer transtronos derivados de estados psicológicos alterados. Hemos podido comprobar que los resultados obtenidos con la aplicación de la *Escala de Valoración del Estilo de Vida Saludable Adquirido* (*E-VEVSA*) (**Tabla VIII**) en una amplia muestra de adultos españoles entre 22 y 77 años de edad nos arroja resultados similares a los obtenidos en otros estudios de ámbito nacional, europeo e iberoamericano.

Tabla VIII: Escala de valoración del Estilo de Vida Saludable Adquirido (E-VEVSA).

A: NUNCA   B: CASI NUNCA   C: A VECES   D: CON BASTANTE FRECUENCIA   E: CON MUCHA FRECUENCIA

	Desde hace años y, hasta la actualidad, he adquirido el hábito de….	A	B	C	D	E
1	Dormir diariamente entre 7 y 9 horas					
2	Tener problemas personales y/o sociales por el consumo de alcohol					
3	Ser cohibido e introvertido en el trato con la gente					
4	Preocuparme y controlar en revisiones médicas mi peso corporal					
5	Incluir dulces o bollería industrial en mi dieta diaria					
6	Hacer sentir a los demás que son muy importantes en mi vida					
7	Tener pereza y sentir agotamiento al levantarme cada mañana					
8	Realizar ejercicio físico o deporte al menos 3 o 4 días a la semana					
9	Tener problemas personales o sociales debido al consumo de tabaco					
10	Alterarme por sucesos de escasa relevancia					
11	Incluir la fruta en mi dieta diaria					
12	Preocuparme y controlar en revisiones médicas mi corazón y circulación					
13	Acostarme a dormir antes de la media noche (24:00 horas)					
14	Realizar ejercicio físico ligero o moderado entre 30 y 60 minutos por sesión					
15	Consultar con un profesional de dietética y nutrición mi dieta alimenticia					
16	Obsesionarme por el cuidado de mi salud y las enfermedades					
17	Incluir embutidos y otras grasas en mi dieta diaria					
18	Estar ansioso y estresado					
19	Preocuparme y controlar en revisiones médicas mi tensión arterial					
20	Ver televisión o jugar a videojuegos pasada la media noche (24:00 h.)					
21	Estar con poco ánimo para realizar las tareas cotidianas o laborales					
22	Beber abundante agua en mi dieta diaria (entre 2 y 3 litros)					
23	Preocuparme y controlar en revisiones médicas mi estado mental y emocional					

24	Destacar o haber destacado en Educación Física o deporte escolar					
25	Hacer amistades con mucha facilidad					
26	Incluir refrescos gaseosos en mi dieta diaria					
27	Llevar la iniciativa para tomar decisiones dentro de mi grupo de amigos					
28	Preocuparme y controlar en revisiones médicas mis triglicéridos en sangre					
29	Tener muy baja autoestima					
30	Frecuentar lugares de fumadores					
31	Ser reconocido por los demás por mis cualidades físicas o deportivas					
32	Dormir plácidamente sin interrupciones ni desvelos					
33	Mantener y cuidar las relaciones con mis amigos más cercanos					
34	Preocuparme y controlar en revisiones médicas mi sistema inmunológico					
35	Consumir drogas ilegales (marihuana, cocaína, heroína, éxtasis, etc.					
36	Ser o haber sido muy bueno en la práctica de ejercicio físico y en la mayoría de deportes					
37	Beber más alcohol que mis amigos más cercanos					
38	Practicar o haber practicado deporte en competiciones federadas					
39	Preocuparme y controlar en revisiones médicas la analítica sanguínea					
40	Incluir el pescado en mi dieta diaria					
41	Hacerme valorar y sentirme bien considerado por mis amigos					
42	Beber hasta embriagarme					
43	Incluir carne en mi dieta diaria más de 3 días por semana					
44	Fumar más que mis amigos más cercanos					
45	Caer bien a todo el mundo					
46	Preocuparme y controlar en revisiones médicas mis niveles de azúcar en sangre					
47	Mantener un clima agradable en mi entorno de trabajo o estudios					
48	Hacer sentir a los demás que pueden contar conmigo para cualquier necesidad					
49	Estar mucho tiempo sentado frente al televisor o videojuegos					
50	Aliviar mi tensión contando mis problemas a una persona de confianza					
51	Fumar al día una media de: A: NO FUMO B: Menos de 5 cigarrillos C: Entre 6 y 15 D: Entre 16 y 30 E: Más de 30 En relación a la cantidad de cigarrillos consumidos tuvimos en cuenta las aportaciones de Londoño Pérez et al. (2012), quedando las puntuaciones: 5 (no fumador); 4 (entre 1 y 5 cigarrillos al día); 3 (entre 6 y 15 cigarrillos al día); 2 (entre 16 y 30 cigarrillos al día) y 1 (Más de 30 cigarrillos al día).					
52	Cuántos días bebe alcohol por semana: No bebo alcohol: ☐ Si bebo: ☐ ……………… días Qué cantidad y tipo de bebida suelo beber entre semana……………………………………… Qué cantidad y tipo de bebida suelo beber los fines de semana …………………………… Para evaluar el nivel de consumo de alcohol seguimos las aportaciones de Rodríguez Martos (2005), que utilizan las llamadas Unidades de Bebida Estándar (UBE) para estimar la cantidad diaria de alcohol ingerido que, actualmente, es el método de referencia en todos los niveles asistenciales. Permite una cuantificación rápida del consumo y una conversión fácil a gramos de alcohol consumidos cada día por el sujeto. Cada unidad UBE corresponde a 10 gramos de alcohol consumidos y, si tenemos una relación de cada bebida y su correspondiente valor en UBE por cantidad consumida (un litro, un vaso, una copa, un combinado, etc.) la conversión es sencilla e inmediata. La conversión se realiza de la siguiente manera: **MUJERES:** 1: > 28 UBE; 2: > 17 UBE; 3: > 14 UBE; 4: 7-14 UBE; 5: < 7 UBE **HOMBRES:** 1: > 42 UBE; 2: > 28 UBE; 3: > 21 UBE; 4: 14-21 UBE; 5: < 14 UBE					

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ORIGINAL

Impact of L-Arginine Supplementation on Endometrial Thickness in Infertile Patients with Refractory Thin Endometrium: A Randomized Controlled Trial

Impacto de la Suplementación con L-Arginina en el Grosor Endometrial en Pacientes Infértiles con Endometrio Delgado Refractario: Un Ensayo Controlado Aleatorizado

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Abstract

Background: This randomized controlled trial aimed to evaluate the effects of L-arginine supplementation on endometrial thickness and reproductive outcomes in women with infertility associated with refractory thin endometrium.

Methods: Patients with infertility (N=84) were randomly assigned to L-arginine (N=42) or control (N=42) groups. Baseline demographic parameters, infertility-related factors, and gynecologic histories were recorded. L-arginine treatment was administered, and endometrial thickness was measured using transvaginal ultrasound pre- and post-treatment. Reproductive outcomes, including embryo quality, implantation rate, pregnancy rate, and abortion rate, were assessed. Statistical analysis was performed with GraphPad Prism 10.0, with P<0.05 being considered as the threshold of significance.

Results: A total of 84 infertile with a mean age of 35.5 ± 6.78 years were recruited. Following L-arginine treatment, a significant increase in endometrial thickness was observed (3.3 ± 0.72 mm pre-treatment vs. 7.79 ± 1.72 mm post-treatment, P < 0.001). The pregnancy rate was comparable between the L-arginine and control groups (21.4% vs. 28.6%, P > 0.05). No statistically significant differences were observed between the two groups in terms of embryo quality, endometrial preparation failure, or gestational sacs. A significantly higher proportion of cleaved embryos was found in the L-arginine group (97.6% vs. 78.6%, P=0.002), though this did not translate to improved pregnancy outcomes.

Conclusion: L-arginine significantly increased endometrial thickness, but no substantial improvements in pregnancy rates or other reproductive outcomes were observed compared to the control group. Further studies are needed to determine the role of L-arginine in fertility treatment.

Key words: Refractory Thin Endometrium, Endometrial Thickness, L-arginine, Embryo, Infertility, Pregnancy.

Resumen

Antecedentes: Este ensayo controlado aleatorizado tuvo como objetivo evaluar los efectos de la suplementación con L-arginina sobre el grosor endometrial y los resultados reproductivos en mujeres con infertilidad asociada a un endometrio delgado y refractario.

Métodos: Las pacientes con infertilidad (N=84) fueron asignadas aleatoriamente a los grupos de L-arginina (N=42) o control (N=42). Se registraron parámetros demográficos iniciales, factores relacionados con la infertilidad e historiales ginecológicos. Se administró tratamiento con L-arginina y se midió el grosor endometrial mediante ultrasonido transvaginal antes y después del tratamiento. Se evaluaron los resultados reproductivos, incluyendo calidad embrionaria, tasa de implantación, tasa de embarazo y tasa de aborto. El análisis estadístico se realizó con GraphPad Prism 10.0, considerando significativo un valor de P<0.05.

Resultados: Se reclutó un total de 84 mujeres con infertilidad, con una edad promedio de 35.5 ± 6.78 años. Tras el tratamiento con L-arginina, se observó un aumento significativo en el grosor endometrial (3.3 ± 0.72 mm antes del tratamiento frente a 7.79 ± 1.72 mm después del tratamiento, P < 0.001). La tasa de embarazo fue comparable entre los grupos de L-arginina y control (21.4% vs. 28.6%, P > 0.05). No se observaron diferencias estadísticamente significativas entre los dos grupos en términos de calidad embrionaria, falla en la preparación endometrial o sacos gestacionales. Se encontró una proporción significativamente mayor de embriones segmentados en el grupo de L-arginina (97.6% vs. 78.6%, P=0.002), aunque esto no se tradujo en mejores resultados de embarazo.

Conclusión: La L-arginina incrementó significativamente el grosor endometrial, pero no se observaron mejoras sustanciales en las tasas de embarazo u otros resultados reproductivos en comparación con el grupo control. Se necesitan más estudios para determinar el papel de la L-arginina en el tratamiento de la fertilidad.

Palabras clave: Endometrio delgado refractario, Grosor endometrial, L-arginina, Embrión; Infertilidad, Embarazo.

Introduction

The endometrium is a dynamic tissue that plays a crucial role in the process of embryo implantation, which is pivotal for the establishment of pregnancy[1]. Structurally, the endometrium consists of two distinct layers: the basal layer, which remains relatively unchanged throughout the menstrual cycle, and the functional layer, which undergoes periodic transformations to prepare for potential embryo implantation[2]. These changes occur during the menstrual, proliferative, and secretory phases of the cycle. In the absence of pregnancy, the functional layer is shed during menstruation, maintaining regenerative capacity[3]. For successful conception, a specific endometrial thickness is necessary, with a minimum threshold of 6 mm considered ideal for embryo implantation[4].

A thin endometrium, defined as an endometrial thickness below 6 mm, is a recognized obstacle to achieving pregnancy. Refractory thin endometrium, a condition where the endometrium remains persistently thin despite therapeutic intervention, significantly reduces the probability of conception[5], whether through natural intercourse or assisted reproductive techniques (ART) such as in vitro fertilization (IVF)[6,7]. The causes of refractory thin endometrium are multifactorial, ranging from infections and previous medical interventions to idiopathic origins. In most cases, this condition remains challenging to treat, with conventional therapies often yielding less than promising results, leading to cycle cancellations and failed implantation attempts[5].

Various strategies have been developed to address thin endometrium, including extended use of estrogen therapy[8], vitamin E supplementation[9], vaginal sildenafil citrate[10], and more recently, regenerative approaches like platelet-rich plasma (PRP) infusions[11] and granulocyte colony-stimulating factor (G-CSF)[12]. However, many of these treatments have shown limited success, particularly in patients with refractory thin endometrium, highlighting the need for more effective therapeutic interventions.

L-Arginine, a semi-essential amino acid and a precursor to nitric oxide, has been recognized for its potential to improve blood flow to various tissues, including the endometrium. Its ability to enhance uterine blood flow has made it a promising candidate for addressing issues of thin endometrium, with the aim of improving endometrial receptivity and increasing the chances of successful embryo implantation[13]. L-Arginine has been shown to have beneficial effects on fertility and pregnancy, largely due to its role in increasing nitric oxide production and reducing oxidative stress. In animal studies, L-Arginine supplementation has demonstrated its potential to alleviate fertility issues caused by oxidative stress. For instance, a study on female rats exposed to chronic intermittent hypoxia (CIH) revealed that oxidative stress

in the ovaries adversely affected fertility by inducing germ cell apoptosis and disrupting ovarian function. However, when L-Arginine was given, it improved the antioxidant capacity, reduced ovarian tissue damage, and restored fertility by decreasing oxidative stress markers[14]. In human studies, L-Arginine has similarly shown promising results, particularly in improving pregnancy outcomes. A systematic review of clinical studies found that L-Arginine supplementation reduced the risk of developing preeclampsia and decreased blood pressure in pregnant women, while improving fetoplacental circulation[15]. Despite its theoretical benefits, the clinical impact of L-Arginine supplementation in patients with refractory thin endometrium has not been thoroughly investigated.

In this randomized controlled trial, we sought to evaluate the effects of L-Arginine supplementation on endometrial thickness in 84 infertile patients with refractory thin endometrium, who were randomly assigned to trial and control groups each involving 42 patients. By exploring the potential of L-Arginine as a therapeutic intervention, this study aimed to provide new insights into the management of thin endometrium-related infertility and contribute to improving reproductive outcomes for patients who have limited treatment options.

Methods

Study Design
This study was a single-blind randomized clinical trial designed to evaluate the impact of L-Arginine supplementation on endometrial thickness in infertile women with refractory thin endometrium. The trial was conducted on women undergoing in vitro fertilization (IVF) cycles with frozen embryo transfer (FET).

Participants
Participants included infertile women aged 20 to 42 years with a history of thin endometrium, defined as an endometrial thickness of less than 7 mm measured by transvaginal ultrasound (5–9 MHz probe) in previous evaluation cycles. All participants were resistant to standard treatments for thin endometrium.

Patient Eligibility Criteria
Inclusion Criteria:

- Infertile women aged 20–42 years
- Endometrial thickness < 7 mm (assessed via transvaginal ultrasound)
- Resistance to standard treatment for thin endometrium
- Normal hysterosalpingography, with no uterine anomalies

Exclusion Criteria:
- Uterine abnormalities (e.g., recurrent adhesions, submucosal fibroids, endometrial polyps)

- Severe endometriosis, adenomyosis, or congenital uterine anomalies
- Use of additional infertility treatments (e.g., growth hormone, dexamethasone, prednisolone, sildenafil, G-CSF)
- Known allergy to L-Arginine
- Declined participation

Randomization and Blinding

Block randomization was performed using Stata 14.0 software, with blocks of four participants, for a total of 21 blocks. Participants were randomly assigned to the intervention (L-Arginine) or control group. The outcome assessor was blinded to the treatment allocation to minimize bias. The study procedure is reported in the CONSORT flowchart in **Figure 1**.

Intervention Protocol

Patients in the intervention group were administered L-Arginine sachets (1 g every 12 hours) starting from the cycle preceding embryo transfer. L-Arginine supplementation was discontinued after embryo transfer. Estradiol valerate was initiated on cycle days 1-2 (2 mg every 8 hours for 3 days, then every 6 hours for another 3 days), along with L-Arginine, to stimulate endometrial growth. If the endometrial thickness remained below 7 mm, the estradiol dosage was increased incrementally every 3 days up to a maximum of 12 mg daily.

Figure 1: CONSORT flowchart of patient recruitment.
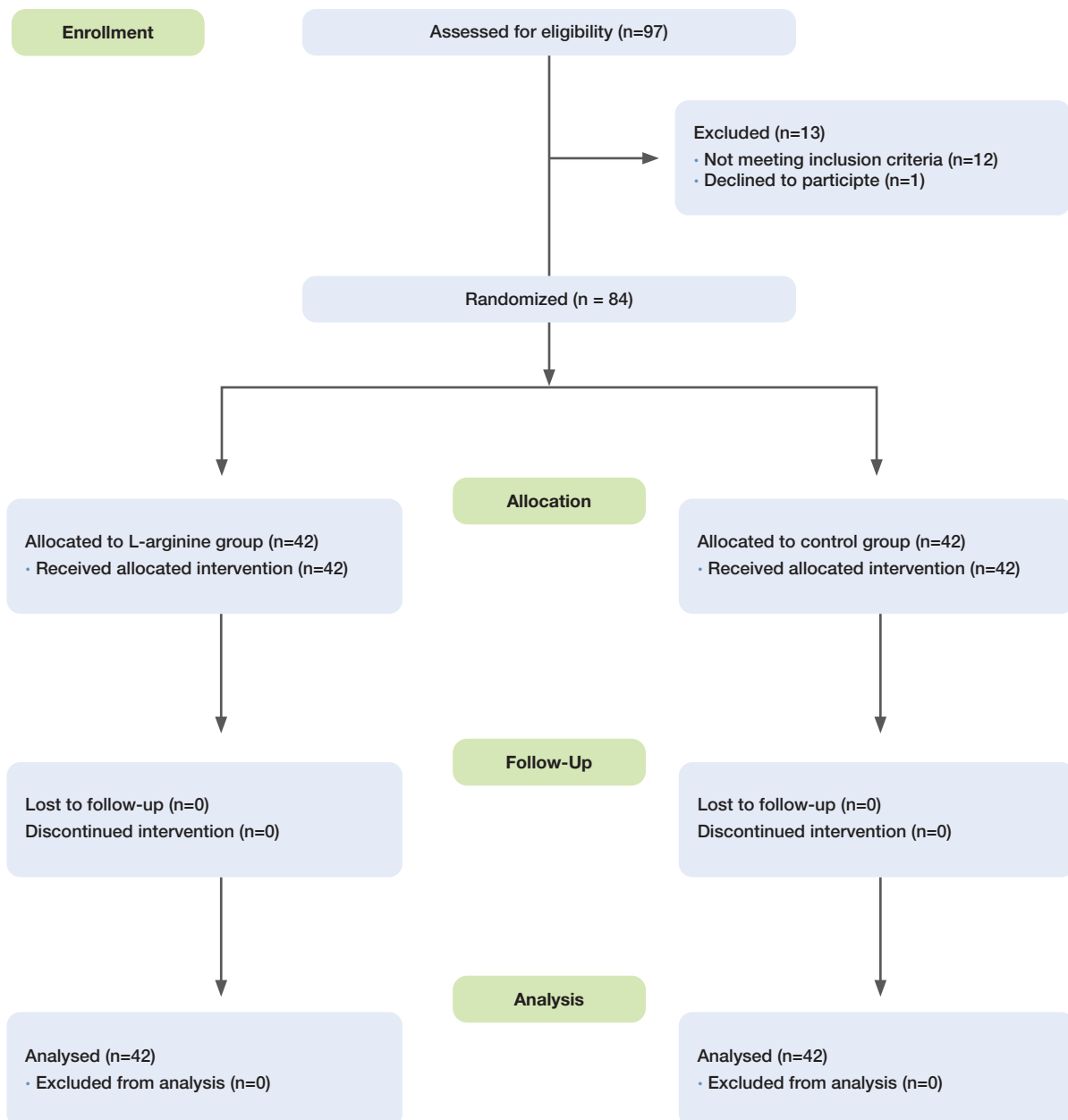
Heparin (5000 units every 12 hours) was administered starting with the estradiol treatment. When the endometrial thickness exceeded 7 mm, progesterone was administered (75 mg for 2 days, followed by 100 mg for another 2 days). On the fourth day of progesterone treatment, 2-3 grade A embryos were transferred. Estradiol valerate and vaginal progesterone (100 mg) were continued until pregnancy was confirmed. Fourteen days after embryo transfer, serum beta-HCG was checked to determine pregnancy status. Hormonal support was maintained until the 12th week of pregnancy if beta-HCG was positive.

Sample Size Calculation

The sample size was determined using G*Power software, based on an alpha error of 5% and a power of 80%. According to a study by So et al., the expected mean increase in endometrial thickness was 9.5 ± 1.5 mm in the control group and 10.2 ± 1.8 mm in the intervention group[16]. With an estimated effect size of 0.42, the minimum sample size required was 42 participants per group, for a total of 84 participants.

Outcome Measures

The primary outcome was the change in endometrial thickness after L-Arginine supplementation, measured by transvaginal ultrasound. Secondary outcomes included pregnancy rates (assessed via serum beta-HCG), quality of implanted embryos, failed endometrial preparation and cycle cancellation.

Statistical Analysis

Data were analyzed using GraphPad Prism 10.0 software. Continuous variables were expressed as mean ± standard deviation (SD) and categorical variables as frequencies (percentages). Independent t-tests were used to compare normally distributed continuous variables, while the Mann-Whitney U test was applied to non-normally distributed data. Categorical variables were analyzed using the Chi-square test, and Fisher's exact test was used when the expected frequency in any cell was less than 5. A p-value of 0.05 was considered statistically significant.

Ethical Considerations

The protocol of the present clinical trials was approved by Research Ethics Committee (REC) of Tabriz University of Medical Sciences (Approval ID: IR.TBZMED.REC.1403.452). All patients were asked to provide written informed consent prior to participation in the trial. Patient credentials and identifying information were kept confidential throughout the study. The trial was registered with the Iranian Registry of Clinical Trials (No.: IRCT20130115012146N10).

Results

Demographic Information and Past Medical History

A total of 84 patients with a mean age of 35.5 ± 6.78 years were recruited to the trial. Demographic information of patients is reported in Table 1. The mean reported age for the spouses was 39.4 ± 6.52 years. In general, the patients were overweight with a mean body mass index (BMI) of 27.2 ± 3.95 corresponding to an average weight and height of 69.8 ± 14.5 kg and 161.0 ± 5.98 cm, respectively. Hypothyroidism was the most frequently reported comorbidity with a prevalence of 26.2%, followed by hypertension (2.4%) and diabetes mellitus (2.4%). Seropositivity for HBs antigen was reported in 2 (2.4%) patients. In terms of gynecologic history, 4 (4.8%) patients reported positive history of past myomectomy. Curettage, with the aim of abortion, was only noted in 2 (2.4%) patients, while dilatation and curettage (D&C) was reported in a single patient (1.2%). To ensure proper randomization of patients to the L-arginine (trial) and control groups, P-values were calculated for all demographic parameters (**Table I**), which indicated no statistically significant difference between the two groups in any of demographic parameters, confirming homogeneous distribution of patients in the two groups.

Table I: Demographic information of patients.

Demographic		Trial			P-value
		L-Arginine (N=42)	Control (N=42)	Total (N=84)	
Age (yr)	Patient (Female)	35.4 ± 6.36	35.5 ± 7.26	35.5 ± 6.78	0.949
	Spouse (Male)	38.8 ± 6.06	40.0 ± 6.96	39.4 ± 6.52	0.396
Anthropometrics	Weight (kg)	70.7 ± 15.3	69.0 ± 13.8	69.8 ± 14.5	0.592
	Height (cm)	162.0 ± 6.58	161.0 ± 5.39	161.0 ± 5.98	0.638
	BMI (kg/m^2)	27.6 ± 4.21	26.9 ± 3.67	27.2 ± 3.95	0.395
Comorbidity	HTN	2 (4.8%)	0 (0%)	2 (2.4%)	0.494
	DM	0 (0%)	2 (4.8%)	2 (2.4%)	0.494
	Hypothyroidism	12 (28.6%)	10 (23.8%)	22 (26.2%)	0.620
	Hyperprolactinemia	1 (2.4%)	0 (0%)	1 (1.2%)	1.000
	Skin Cancer	0 (0%)	1 (2.4%)	1 (1.2%)	1.000
	Depression	0 (0%)	1 (2.4%)	1 (1.2%)	1.000
	HBs Ag$^+$	2 (4.8%)	0 (0%)	2 (2.4%)	0.494
Gynecologic History	Curettage (Abortion)	2 (4.8%)	0 (0%)	2 (2.4%)	0.494
	D&C	1 (2.4%)	0 (0%)	1 (1.2%)	1.000
	Myomectomy	3 (7.1%)	1 (2.4%)	4 (4.8%)	0.616

BMI: body mass index; **D&C:** dilation and curettage; **DM:** diabetes mellitus; **HBs Ag$^+$:** HBs antigen seropositivity; **HTN:** hypertension

The obstetric history of patients from both groups, with over-dispersed distribution, is reported in **table II** and visualized in **figure 2**.

While the number of past pregnancies was higher in the L-arginine group (0.86, [0.56-1.15]), compared with the controls (0.48, [0.21-0.74]), to a significant extent (P=0.028), no statistically significant difference was observed between the two groups in terms of deliveries, live births, abortions and ectopic pregnancies (P > 0.05).

Table II: Obstetric history of patients in L-arginine and control groups. (Data are reported as mean with 95% confidence intervals due to over-dispersed distribution).

Obstetric History	Trial						P-value
	L-Arginine (N=42)		Control (N=42)		Total (N=84)		
	Mean	95% CI	Mean	95% CI	Mean	95% CI	
Pregnancy	0.86	[0.56-1.15]	0.48	[0.21-0.74]	0.66	[0.46-0.86]	0.028
Delivery	0.31	[0.15-0.47]	0.12	[0.02-0.22]	0.21	[0.12-0.31]	0.056
Live Birth	0.24	[0.09-0.39]	0.09	[0.003-0.19]	0.17	[0.08-0.25]	0.129
Abortion	0.48	[0.23-0.72]	0.33	[0.10-0.57]	0.41	[0.24-0.57]	0.241
Ectopic Pregnancy	0.12	[-0.004-0.24]	0.05	[-0.05-0.11]	0.08	[0.006-0.160]	0.183

Figure 2: Reproductive history of patients in L-arginine and control groups, including the number of **A)** pregnancies, **B)** deliveries, **C)** live births, **D)** abortions and **F)** ectopic pregnancies.
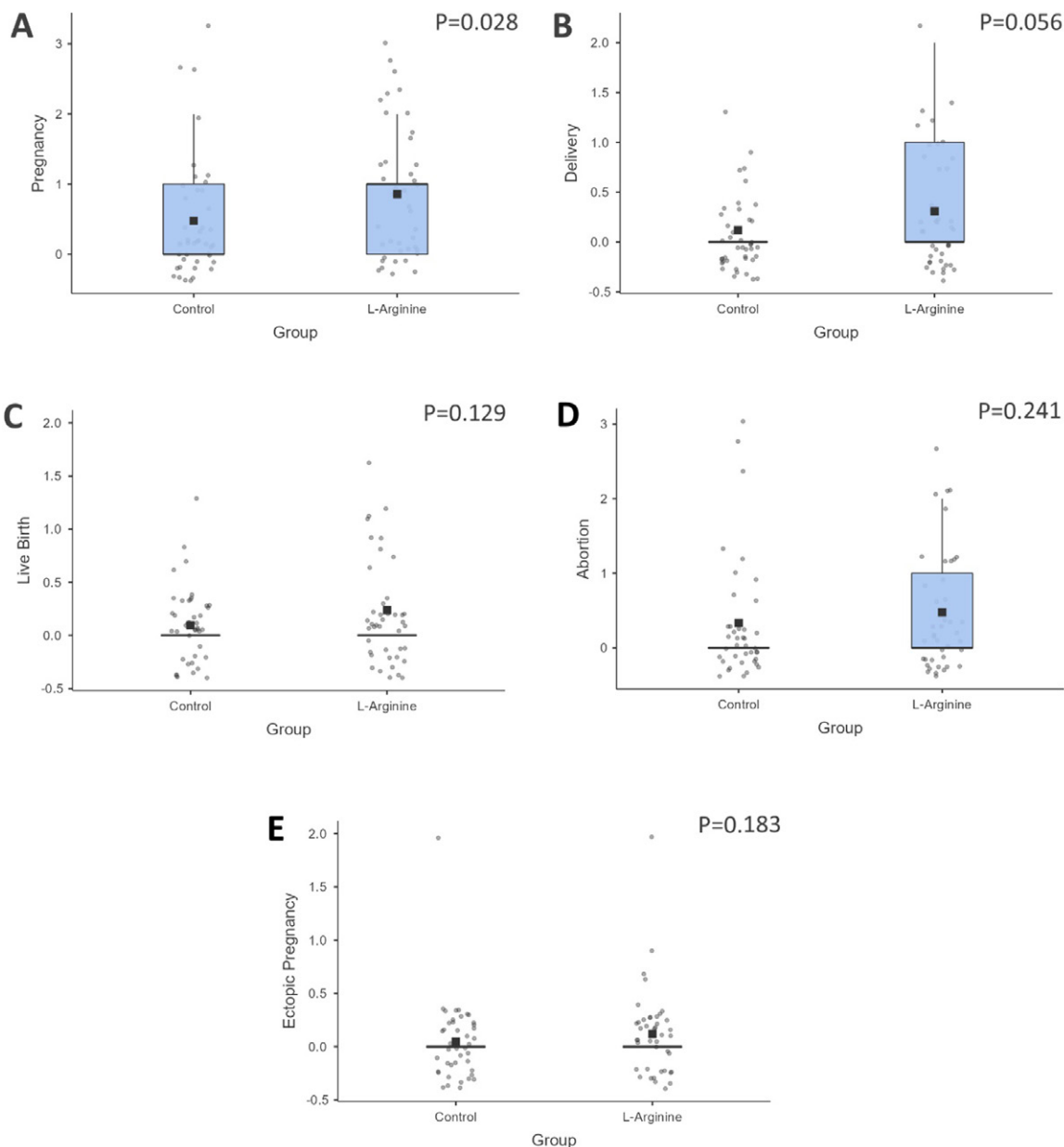
Infertility Type and Causal Factors

Table III summarizes the findings regarding infertility and related contributing factors in the L-arginine and control groups, as well as the entire trial. As reported, the mean duration of infertility among all patients was 7.30 ± 4.90 years, with patients in the L-arginine group being infertile for a significantly longer period compared with those in the control group (8.79 ± 5.34 vs. 5.82 ± 3.96, P=0.005). Conversely, no statistically significant difference was noted between the two group with regard to other infertility-related factors, indicating homogeneous distribution of contributing factors in the two groups.

Patients with primary infertility constituted the majority of the population (79.8%), leaving a total prevalence of 20.2% for secondary infertility. Few patients (2, 2.4%) had unexplained infertility, while no patients were found to have combined infertility. The majority of patients reported regular menstrual cycles (79.8%). Polycystic ovary (PCO) and decreased ovarian reserve (DOR) were fairly common with prevalence rates of 32.1% and 35.7%, respectively, while tubal factor and hypomenorrhea were reported to a considerably lesser extent, with prevalence rates falling below 10%. Male factor was comparably frequent among patients, with an overall prevalence of 36.9%.

Table III: Prevalence of infertility types and causal factors among patients.

Factor		Trial			P-value
		L-Arginine (N=42)	Control (N=42)	Total (N=84)	
Duration of Infertility (yr)		8.79 ± 5.34	5.82 ± 3.96	7.30 ± 4.90	0.005
Infertility	Primary	33 (78.6%)	34 (81.0%)	67 (79.8%)	0.786
	Secondary	9 (21.4%)	8 (19.0%)	17 (20.2%)	
Unexplained Infertility		1 (2.4%)	1 (2.4%)	2 (2.4%)	1.000
Combined Infertility		0 (0%)	0 (0%)	0 (0%)	1.000
Menstrual Cycle	Regular	33 (78.6%)	34 (81.0%)	67 (79.8%)	0.786
	Irregular	9 (21.4%)	8 (19.0%)	17 (20.2%)	
PCO		14 (33.3%)	13 (31.0%)	27 (32.1%)	0.815
DOR		15 (35.7%)	15 (35.7%)	30 (35.7%)	1.000
Tubal Factor		3 (7.1%)	3 (7.1%)	6 (7.1%)	1.000
Hypomenorrhea		2 (4.8%)	0 (0%)	2 (2.4%)	0.152
Male Factor		16 (38.1%)	15 (35.7%)	31 (36.9%)	0.821

DOR: decreased ovarian reserve; **PCO:** polycystic ovary.

Effect of L-arginine Treatment on Endometrial Thickness

To determine the effect of L-arginine treatment on endometrial thickness, patients were evaluated using transvaginal ultrasound prior to and after receiving the scheduled dose of L-arginine. Overall, the mean thickness of endometrium was 5.54 ± 2.61 mm. As shown in **figure 3**, treatment with L-arginine was found to significantly increase endometrial thickness from a mean pretreatment thickness of 3.3 ± 0.72 mm to a mean posttreatment thickness of 7.79 ± 1.72 mm (P < 0.001).

Reproductive Outcomes in L-arginine and Control Groups

To determine the effect of L-arginine on reproductive outcomes in patients with infertility, several reproductive outcomes were monitored and reported in **table IV**. The mean number of implanted embryos was 2.32 ± 0.62, with patients in the control group showing slightly higher numbers, which were deemed as statistically insignificant. The majority of implanted embryos were in the cleavage stage (88.1%), with the L-arginine group showing a markedly high frequency of cleaved embryos (97.6%) compared with the control group, among which only 78.6% of embryos were in the cleavage state. Conversely, embryos implanted to control patients also comprised other stages including cleavage-to-morula (9.5%) and morula (11.9%). This discrepancy between the two groups with regard to the embryo type was

Figure 3: Comparison of pretreatment and posttreatment endometrial thickness (mm) in patients receiving L-arginine.

deemed as statistically significant (P=0.002). Of the 84 pregnancy tests, a total of 21 returned positive results, without a significant difference between the two groups (21.4% vs. 28.6%). Post-implantation abortion was rare and only reported in one patient from the L-arginine group, without any meaningful difference. Ectopic pregnancy was not observed in any patients following embryo implantation.

Reproductive outcomes with over-dispersed distribution are reported in **table V** and visualized in **figure 4**.

Table IV: Reproductive outcomes of treatment in the L-arginine and control groups.

Outcome		Trial			P-value
		L-Arginine (N=42)	Control (N=42)	Total (N=84)	
Implanted Embryos		2.31 ± 0.56	2.33 ± 0.69	2.32 ± 0.62	0.862
Implanted Embryo Stage	Cleavage	41 (97.6%)	33 (78.6%)	74 (88.1%)	0.002
	Blastocyte	1 (2.4%)	0 (0%)	1 (1.2%)	
	Cleavage-to-Morula	0 (0%)	4 (9.5%)	4 (4.8%)	
	Morula	0 (0%)	5 (11.9%)	5 (6.0%)	
Pregnancy Test	Positive	9 (21.4%)	12 (28.6%)	21 (25.0%)	0.450
	Negative	33 (78.6%)	30 (71.4%)	63 (75%)	
Post-Implantation Abortion		1 (2.4%)	0 (0%)	1 (1.2%)	0.314
Post-Implantation Ectopic Pregnancy		0 (0%)	0 (0%)	0 (0%)	–

Table V: Reproductive outcomes of treatment in the L-arginine and control groups. (Data are reported as mean with 95% confidence intervals due to over-dispersed distribution).

Outcome		Trial						P-value
		L-Arginine (N=42)		Control (N=42)		Total (N=84)		
		Mean	95% CI	Mean	95% CI	Mean	95% CI	
Endometrial Preparation Failure		0.38	[0.08-0.68]	0.14	[-0.02-0.30]	0.26	[0.09-0.43]	0.131
Cycle Cancellation		0	–	0	–	0	–	–
Embryo Quality	Grade A	1.33	[1.04-1.62]	1.74	[1.41-2.06]	1.54	[1.32-1.75]	0.070
	Grade B	0.74	[0.52-0.96]	0.57	[0.32-0.82]	0.65	[0.49-0.82]	0.167
	Grade C	0.12	[-0.004-0.24]	0.24	[0.11-0.37]	0.08	[0.006-0.160]	0.674
Gestational Sacs		0.14	[0.01-0.27]	0.14	[0.03-0.25]	0.14	[0.06-0.22]	0.789

Figure 4: Reproductive outcomes of treatment in L-arginine and control groups, including **A)** endometrial preparation failure, **B)** cycle cancellation, **C)** embryo quality – grade A, **D)** embryo quality – Grade B, **E)** embryo quality – grade C and **F)** gestational sacs.
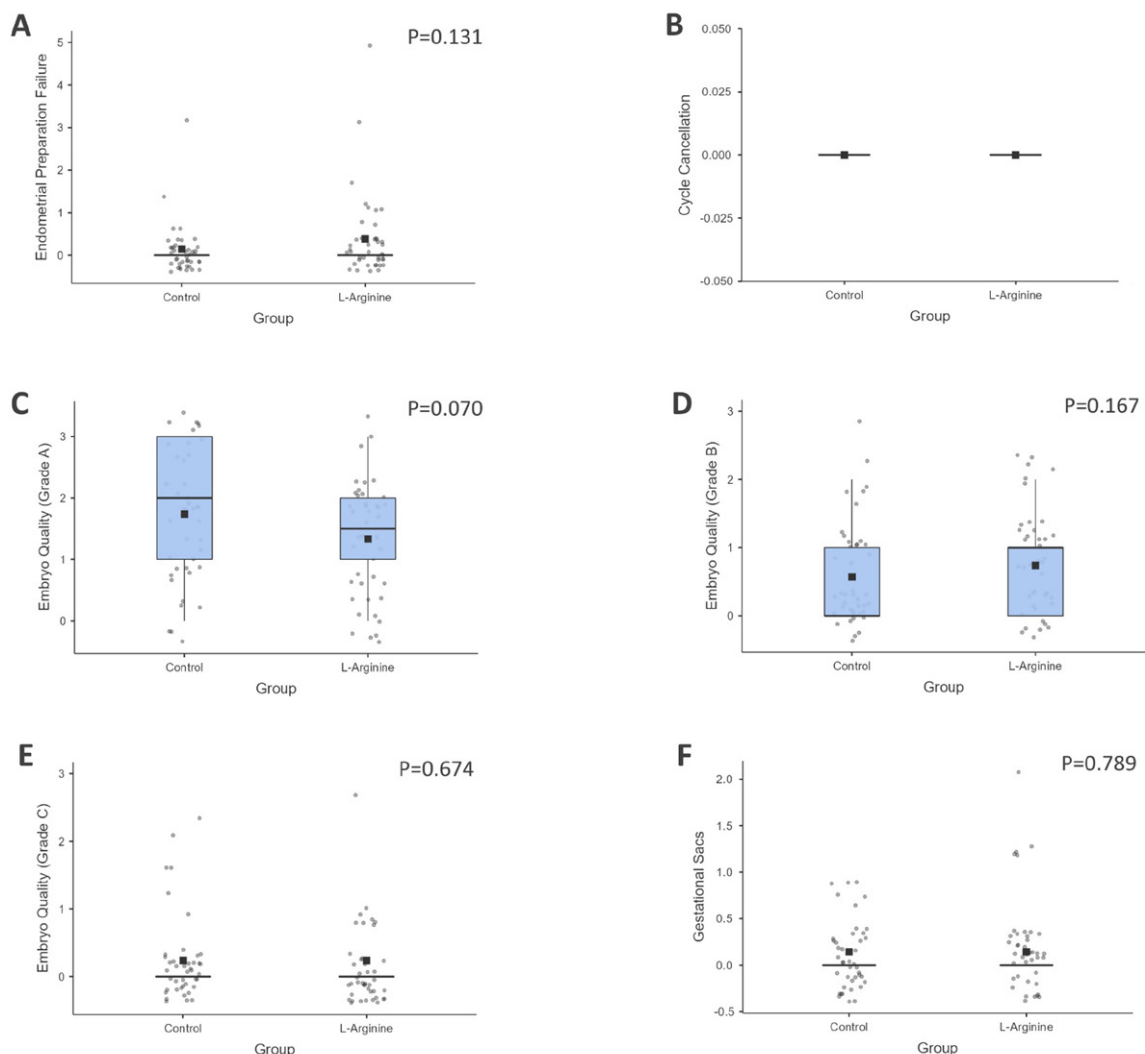
As can be seen, patients had generally low rates of endometrial preparation failure (0.26, [0.09-0.43]), without any noticeable difference between the two groups. Cycle cancellation was not reported in any of the patients from either group. Embryo quality (grades A to C) was largely comparable between the two groups; however, the control group was found to have a slightly higher mean count of grade A embryos (1.74, [1.41-2.06]) compared to the L-arginine group (1.33, [1.04-1.62]), although this difference was not statistically significant (P=0.070), indicating that L-arginine treatment did not have any meaningful effect on embryo quality. Lastly, gestational sacs were few overall (0.14, [0.06-0.22]) and highly similar between the two groups (P=0.789), though, one patient from the L-arginine group had 2 gestational sacs as visualized in the box plot. Collectively, treatment with L-arginine was not accompanied by meaningful differences between the two groups with regard to endometrial preparation failure, embryo quality and gestational sacs.

Discussion

In this study, we investigated the effects of L-arginine treatment on endometrial thickness and reproductive outcomes in a cohort of 84 women with infertility of different either male or female origin. Patients were randomly assigned to receive either L-arginine + ART protocol or ART protocol alone, and the baseline characteristics, including demographic and infertility-related parameters, were comparable between the two groups. Significant findings included an increase in endometrial thickness following L-arginine treatment (P < 0.001), by approximately 2.36-fold, and a notable difference in the stage of implanted embryos, with the L-arginine group showing a higher prevalence of cleavage-stage embryos (P=0.002). However, no statistically significant differences were observed in other reproductive outcomes, including pregnancy rates, embryo quality, or gestational sacs, suggesting that while L-arginine may enhance endometrial thickness, it does not substantially improve overall reproductive success.

The significant increase in endometrial thickness observed in the trial following L-arginine supplementation is supported by a body of evidence suggesting that L-arginine exerts positive effects on endometrial function through various molecular and cellular mechanisms. Notably, the role of L-arginine as a precursor for nitric oxide (NO), a potent vasodilator, is likely pivotal to these effects. Increased NO levels contribute to improved blood flow and angiogenesis within the endometrium, which are crucial for endometrial receptivity and embryo implantation[13,17]. The ability of L-arginine to ameliorate oxidative stress, as demonstrated by Kalehoei et al. in 2023, further supports its potential in enhancing the uterine environment. In their study, L-arginine administration normalized oxidative status by restoring total antioxidant capacity and reducing NO and total oxidative stress levels, hence, improving oocyte quality and subsequent embryonic development. These antioxidative properties may also be involved in promoting endometrial thickness by reducing oxidative damage and promoting tissue regeneration[18].

Moreover, the regulation of water transport in the endometrium, as reported by Zhu et al. in 2021, highlights another mechanism by which L-arginine may enhance endometrial thickness. Their study found that L-arginine supplementation increased the expression of aquaporins (AQPs), proteins facilitating water transport, in the endometrial and placental tissues of pregnant gilts. This effect could augment the hydration of the endometrial stroma, hence, facilitating its expansion and improving its capacity to support embryo implantation[19]. Additionally, the modulation of steroid hormone receptor expression, as demonstrated by Gao et al. in 2019, provided further insights into the molecular pathways affected by L-arginine. L-arginine was found to increase the expression of estrogen receptor α (ERα) and progesterone receptor (PGR) in the ovine endometrium, which are highly important for endometrial proliferation and differentiation during the menstrual cycle[20]. The upregulation of these receptors was speculated to contribute to the enhanced endometrial response observed in the trial, as estrogen and progesterone are key regulators of endometrial growth and receptivity.

The influence of L-arginine on angiogenesis is another important factor that may contribute to increased endometrial thickness. In 2018, Gao et al. reported that L-arginine supplementation restored microvessel density (MVD) and decreased angiogenic growth factors, such as vascular endothelial growth factor A (VEGFA) and vascular endothelial growth factor receptor 2 (VEGFR2), in nutrient-restricted sheep, suggesting a role in maintaining vascular homeostasis in the endometrium[21]. Enhanced angiogenesis is thought to sustain sufficient blood supply to the endometrium, promoting tissue expansion and creating an optimal environment for embryo implantation[22,23]. Furthermore, the ability of L-arginine to decrease oxidative stress and improve endothelial function may further enhance endometrial receptivity by maintaining the integrity of the endometrial vasculature[21].

The findings of Greene et al.[6], reported in 2013, also suggested that L-arginine might exert direct effects on endometrial cells by promoting cell proliferation and inhibiting apoptosis. Their study observed that L-arginine increased cell proliferation and reduced mitochondrial-mediated apoptosis in human endometrial cells, effects that were mediated through NO and polyamine biosynthesis[24]. This dual action of promoting cell growth while protecting against apoptosis could explain the significant increase in endometrial thickness observed in the current trial. The reduced apoptosis may also

improve the overall quality and function of the endometrial tissue, further contributing to its receptivity and capacity to support implantation[25].

Beyond the regulatory mechanisms facilitating the potentially beneficial effects of L-arginine supplementation in patients with infertility, the clinical applicability of this approach is equally important, as well. Clinical trials investigating the use of L-arginine in patients seeking pregnancy have shown promising results, particularly in improving endometrial thickness and uterine blood flow, which are critical factors for successful implantation. For instance, Pilania et al. (2021) reported increased endometrial thickness in patients with previously thin endometrium, suggesting a positive role for L-arginine in enhancing uterine conditions during fertility treatments[26]. Similarly, So et al. (2020) found that L-arginine supplementation significantly improved pregnancy rates in women undergoing assisted reproductive technology (ART) for male-factor infertility, indicating its potential benefit in this subgroup[16]. Nevertheless, we did not observe significantly higher rates of positive pregnancy tests in our L-arginine group compared with the controls. Moreover, studies by Takasaki et al. (2010) and Battaglia et al. (1999) demonstrated that L-arginine could improve uterine and ovarian blood flow, leading to better ovarian response and higher pregnancy rates in poor responders[27,28]. These findings, though with different patient populations and study designs, consistently highlight the beneficial effects of L-arginine in fertility treatments, particularly in cases involving thin endometrium or poor ovarian response, reinforcing its potential as an adjunct therapy in ART programs.

Strengths and Limitations

This study's strengths include proper randomization, as demonstrated by the comparable demographic and gynecologic histories between the L-arginine and control groups (P > 0.05), reducing potential confounding factors. The focus on a specific population —patients with refractory thin endometrium— adds clinical relevance, while the inclusion of a control group allows for a clear comparison of outcomes. However, the trial's small sample size and single-center design limit its generalizability, with potential geographic and ethnic homogeneity reducing external validity. Additionally, variability in IVF protocols across different settings, not accounted for in the study, may influence the broader applicability of the results.

Conclusion

Taken together, the results of this trial and the supporting evidence from previous studies suggest that L-arginine supplementation enhances endometrial thickness through a combination of increased blood flow, improved angiogenesis, modulation of steroid hormone receptors, enhanced water transport, and reduced oxidative stress and apoptosis. These mechanisms highlight the multifaceted role of L-arginine in improving endometrial receptivity and its potential as a therapeutic agent in assisted reproductive technologies, particularly for patients with refractory thin endometrium. However, further research is warranted to fully elucidate the precise molecular pathways involved and optimize L-arginine dosing and timing in clinical settings.

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ORIGINAL

The role of gender factors in communicative strategies of stress management

El papel de los factores de género en las estrategias comunicativas de gestión del estrés

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Abstract

Objectives: The aim of the research is to study gender differences in stress management methods through communication.
Methods: Questionnaire survey using standardized questionnaires (Traditional Masculinity-Femininity (TMF) scale, the Hall Emotional Intelligence Test, the Heim Coping Mechanisms Test). The research employed one-way analysis of variance (ANOVA), as well as mean square deviation. The reliability of the methods and instruments was tested by Cronbach's alpha.
Results: The results show marked differences between the groups characterized by predominant femininity, masculinity, and androgyny. The emotional intelligence (EI) of the femininity-dominant group is high, especially regarding Self-regulation and Relationship Management. The masculinity-dominant group shows lower Self-esteem and Total EI Score. The androgyny-dominant group achieves the best results in all EI scales.
Conclusions: The femininity-dominant respondents showed higher results in Self-esteem, Social Awareness and Relationship Management, but their Self-regulation needs improvement. The masculinity-dominant group scored lower in all EI aspects, indicating a need for self-regulation and stress management.
Prospects: Further research may focus on the effects of gender differences on coping strategies and emotional intelligence across cultures.

Key words: Educational environment, professional competencies, skills, higher education, gender, stress management, communication.

Resumen

Objetivos: El objetivo de la investigación es estudiar las diferencias de género en los métodos de gestión del estrés a través de la comunicación.
Métodos: Encuesta mediante cuestionarios estandarizados (escala de Masculinidad-Feminidad Tradicional (TMF), Test de Inteligencia Emocional de Hall, Test de Mecanismos de Afrontamiento de Heim). La investigación empleó análisis de varianza (ANOVA) unidireccional, así como desviación media cuadrática. La fiabilidad de los métodos e instrumentos se comprobó mediante el alfa de Cronbach.
Resultados: Los resultados muestran marcadas diferencias entre los grupos caracterizados por feminidad predominante, masculinidad y androginia. La inteligencia emocional (IE) del grupo de feminidad dominante es alta, especialmente en lo que respecta a la autorregulación y la gestión de las relaciones. El grupo de masculinidad dominante muestra una autoestima y una puntuación total de IE más bajas. El grupo de androginia dominante obtiene los mejores resultados en todas las escalas de IE.
Conclusiones: Los encuestados con predominio de la feminidad mostraron mejores resultados en autoestima, conciencia social y gestión de relaciones, pero su autorregulación necesita mejorar. El grupo con predominio de la masculinidad obtuvo una puntuación más baja en todos los aspectos de la inteligencia emocional, lo que indica una necesidad de autorregulación y gestión del estrés.
Perspectivas: Es posible que futuras investigaciones se centren en los efectos de las diferencias de género en las estrategias de afrontamiento y la inteligencia emocional en distintas culturas.

Palabras clave: Entorno educativo, competencias profesionales, habilidades, educación superior, género, gestión del estrés, comunicación.

Introduction

Gender social behaviour models, which are generally accepted in society and are based on widespread gender stereotypes, ideas of what a "real man" or "real woman" should be, significantly influence the reactions to stressful situations. Gender, or the gender component, is a mandatory component of social identity. However, gender features are not sufficiently objectively covered in the academic literature, despite the fact that the process of forming social stereotypes, in particular gender stereotypes, is described within various theoretical approaches[1]. The problem of overcoming stressful situations is being actively covered in academic literature. Behaviour that helps to overcome stress (coping), resilience, adaptive potential, mental resilience and similar phenomena have become the subject of study by researchers[2].

In the academic literature, it is common to call gender the social sex, which determines a person's behaviour in society and how it will be perceived by others. From the very birth, the mental development of the individual depends on the biological sex, as a moderator of the system of requirements and expectations, which are associated with the concepts of "masculine" and "feminine"[3]. These normative standards are now widely represented in the consciousness of society.

The meaning of the concept of stress should be explained in the context of this study. In the psychological sense, stress can be caused by both internal causes (fear for life, conflicts) and external causes (for example, cold, overheating of the body), the size of which exceeds a certain limit. Stress is a psycho-emotional reaction of an individual to any emotional or physical situation[4]. Stress is an individual reaction that can differ in different people even to the same external influence, and the same person can react in the same way to different external influences.

The notion of coping behaviour that "overcomes" stress has emerged in connection with the development of the concept of stress. Coping is a set of cognitive, emotional, and behavioural strategies used to cope with stressful situations[5]. The authors of this study see the differences in coping strategies depending on the gender of the person under the influence of the stressor. That is why there was a need to conduct research to confirm or refute this hypothesis[6].

Many researchers note that representatives of both genders react differently to the same stressful situation. For the most part, they manage to preserve or quickly restore work capacity and functional reliability, although each person to one degree or another experiences negative experiences, emotional excitement and mental stress under these conditions[7]. The individual differences in the response to stress and the formation of stress

resistance determines the growing interest in studying the mechanisms of regulation of this state, substantiating the ways and methods of coping with it.

The focus of this study is gender differences in communicative strategies of stress management. Attention is paid on how men and women use different coping strategies in response to stressful situations based on their socially determined gender roles. *The research problem* is that the academic literature does not sufficiently objectively cover gender features. This makes it difficult to understand how gender affects coping methods. The issue of the difference in coping strategies between men and women remains under-studied, despite the available theoretical approaches to the study of social stereotypes. These gaps suggest that more detailed analysis is needed to confirm or refute the hypothesis that these differences exist, as well as to identify the sources of these differences.

Research hypothesis H_0 is that there are significant gender differences in managing stress through communication, in particular, men and women use different coping strategies depending on gender roles, social stereotypes, and expectations that influence their reactions to stressful situations. Alternative hypothesis H_1 consists in the absence of significant gender differences in stress management through communication.

The aim of the research is to analyse gender differences in stress management strategies through communication and to identify the influence of social stereotypes on these differences.

Objectives/questions
1. Determine the gender roles of respondents participating in the study;
2. Identify EI levels depending on gender identity;
3. Analyse coping strategies depending on gender identity.

Literature review

A review of recent studies on the issue under research will help to clarify existing trends and identify gaps in the study of gender differences in coping with stress through communication. Such an analysis will contribute to the formulation of a general vision of the chosen topic among other researchers. It can also contribute to the development of more effective coping strategies taking into account gender peculiarities.

An article by Falconier et al.[8] examines the effect of emotion regulation on partners' ability to cope with stress together, known as dyadic coping (DC). The results showed that women's ability to understand and accept their emotions affects how they communicate about stress and how their partners respond to it. Women with high emotional awareness received more support from their partners and coped better with stress together. The

study emphasizes the importance of considering gender specifics in the development of stress management support programmes for couples, which can improve the overall well-being of both individuals and relationships.

A study by Falconier et al.[8] examines ways in which strategic internal communications in organizations can help women to cope with gender discrimination in the workplace. The results show that women feel more confident when they communicate about diversity and inclusion issues. The study identifies gender differences and emphasizes the importance of transparent communication for increasing women's confidence and creating adaptive coping strategies. It also demonstrates that companies can help female employees by being open and involved in addressing gender equality issues.

The work of Deng et al.[9] focused on examining the EI, empathy, and problem-solving skills of nursing students. The authors pay special attention to the gender differences of students. The results show that male students have a lower EI level compared to female students. However, no gender differences were found for empathy and problem-solving ability. There were no relationships between empathy, EI, and problem solving in men, significant relationships were found in women. The obtained results are of great importance in the context of gender differences in stress management through communication, because it emphasizes that taking into account gender peculiarities during the training of nurses can help them to improve their communication skills and the ability to empathize, which is important for effective stress management.

Hofmann et al.[10] study the literature that has examined humour and gender differences, identifying several important themes. The main results are that men are more likely to use an aggressive humour style, while other types of humour do not show significant gender differences. The study emphasizes how important it is to consider gender roles and stereotypes when addressing the topic of gender differences in stress management through communication. The identified differences in the use and perception of humour may influence how well people of different genders communicate, which is important for the development of stress management support programmes.

The article by Eliot et al.[11] emphasizes the importance of considering sex and gender in neurobiological research, as it can affect various aspects of neurobehavioral analysis. The study offers technical advice to improve the quality and reproducibility of such analyses, including the appropriate use of statistical methods and the control of important covariates. Understanding the complexities and nuances of sex and gender will allow more accurate analysis of their impact on stress management and communication. This will help to create better methods of supporting different populations.

A study by Zelco et al.[12] examines the profound effects of sex and gender differences on brain development, behaviour, and response to disease therapy. Thanks to new technologies such as genomics, brain imaging and biobanks, researchers can identify these differences faster and more accurately. The article describes how these technologies, together with bioinformatic analyses, contribute to the understanding of sex and gender differences in brain development and psychopathology. Understanding these differences can facilitate the development of personalized approaches to stress management that take into account the unique needs of different gender groups.

Spadaro et al.[13] discuss cooperation between men and women in situations of conflict of interest. The authors note that the findings differ slightly from previous hypotheses, as they show that men and women generally cooperate about equally. In addition, the study showed that differences in cooperation do not depend on gender, but depend to a large extent on specific circumstances and social context. Cooperation was slightly higher in studies with mostly female participants, but these differences were not significant for levels of conflict of interest or social and economic development. The article contributes to the study of stress management through communication, as it emphasizes the importance of considering social and situational factors, not just gender differences.

Using data from the World Values Survey, Love et al.[14] examine the well-being of women entrepreneurs in 80 countries. The researchers found that female entrepreneurs have lower levels of well-being compared to men in low- and middle-income countries, while female entrepreneurs have higher levels of well-being in high-income countries. The countries with greater gender inequality, low levels of financial development and rigid gender stereotypes have greater differences in well-being between the sexes. According to the authors of the study, awareness of these elements can help in the development of policies and methods aimed at improving the well-being of women entrepreneurs. In turn, this can lead to better stress management and better communication. In order to create an enabling environment for women in business, it is important to consider such factors as gender roles and the economic context.

An article by Stephenson et al.[15] examines how sexual satisfaction affects a person's overall quality of life and how gender differences affect this interaction. The authors found that a moderate correlation between sexual satisfaction and various aspects of quality of life. Men found that internal aspects of sex, such as physical pleasure, had a greater impact on quality of life, while emotional connection with a partner was more important for women.

Deep Smith[16] examines how cultural factors influence emotional regulation and stress management in trade between Latin American countries. The authors identified the factors affecting stress management and business productivity. In addition, the paper examines the role of sales incentives as mediators in these relationships. This allows for a complete understanding of how these components interact with each other and how they affect sales performance in the region. Analysis of the latest publications on the chosen topic identified several unexplored and understudied issues:

a. Although some studies consider cultural differences, a comprehensive examination of the influence of cultural norms on the formation of gender stereotypes and, as a result, on coping strategies remains limited.

b. The specifics of individual communication strategies in the context of overcoming stress, in particular, how personal qualities affect the use of these strategies by representatives of different sexes, has not been studied enough.

c. The effectiveness of different coping strategies for men and women, especially over time, also needs further clarification. There is insufficient conclusive evidence regarding the most effective strategies for each gender.

Coverage of the outlined issues can form the basis for further studies of gender characteristics of the reaction to stress. It will contribute to a deeper understanding of the complex nuances of gender characteristics in the choice of coping strategies. The study of these issues will make it possible to demonstrate the complex and multifaceted nature of the influence of communication on the choice of a strategy for overcoming obstacles by each of the genders.

Methods

Design
The research was conducted in several stages. All stages, as well as their duration and content are presented in **figure 1**. The type of this empirical research can be defined as quantitative with elements of qualitative analysis. It is cross-sectional because it is conducted at one point in time in order to assess coping mechanisms in different groups of people.

Participants
The experiment was conducted at:
1) the Department of Social Sciences and the Humanities, Faculty 1 of the Donetsk State University of Internal Affairs;
2) the Department of Innovative Technologies in Pedagogy, Psychology and Social Work of the Alfred Nobel University;
3) the Department of Psychology, the Faculty of Humanitarian and Economic Education of the Donbas State Pedagogical University;
4) the Department of Psychological Counselling and Psychotherapy, the Faculty of Psychology of V.N. Karazin Kharkiv National University; and
5) the Department of Applied Psychology, the Faculty of Psychology of V.N. Karazin Kharkiv National University.

The experimental group included 400 students aged 18 to 24: 195 men and 205 women. The research was conducted during the year. Students of 2nd-4th years of all majors took part in the experimental work. Such a sample makes it possible to conduct a reliable study and obtain valid and reliable results. After conducting a study of gender differences, all respondents were divided among three groups: "Femininity-dominant", "Masculinity-dominant" and "Androgyny-dominant" according to the results of the Bem Sex Role Inventory (BSRI).

Figure 1: Stages of the research.

Stage 1

September-December 2023

Sampling. Determining gender identity of respondents. At this stage, respondents were divided into groups based on gender identity, and further research was conducted by comparing results between groups.

Stage 2

January-May 2024

At this stage, the coping strategies of the respondents and theie EI level, as an indicator of the ability to communicate, were studied between groups.

Stage 3

June 2024

At the last stage, static data processing was carried out, including a correlation analysis between coping strategies and gender identity of the respondents.

Source: developed by the author

Instruments

The statistical analysis of the obtained results was carried out using the SPSS 16.0 mathematical statistics application package. Diagrams, schemes and other graphic elements are made with the help of MsOffice tools. The respondents were surveyed using the GoogleForms web application. All values are presented in the article in relative (%) and absolute values.

Data collection

a. BSRI is a key tool in investigating gender differences in stress management in this study. It will help to determine the degree of expressiveness of feminine and masculine traits in respondents, which will allow a deeper understanding of how these traits influence the choice of coping strategies and their effectiveness in overcoming stress. In addition, this survey provides an opportunity to investigate whether gender identity is associated with preferences for communication strategies that can help in stress management.

b. Hall Emotional Intelligence Test is used to explore how men and women use their emotional abilities to cope with the stress during communication[17]. This method identifies differences in how individuals cope with stress. In the context of this study, knowing the EI level will help to understand how respondents use their emotional skills to cope with stress through communicative strategies.

c. Heim's Coping Mechanisms diagnostic technique is a comprehensive tool designed to assess how people respond to and cope with stress. The technique is aimed at identifying specific strategies or coping mechanisms that a person uses when faced with a stressful situation. The technique classifies coping strategies into different types, including problem solving, social support seeking, avoidance, and emotional regulation[18].

Analysis of data

a. The reliability of the selected methods was checked using Cronbach's alpha. It characterizes the internal consistency of the test items and is calculated according to the formula:

$$\frac{N}{(N-1)} \left(\frac{\sigma_x^2 - \sum_{i=1}^{N} \sigma_{Y_i}^2}{\sigma_x^2} \right) \qquad (1)$$

where σ_x^2 – the entire test score variance; $\sigma_{Y_i}^2$ – the i element variance.

b. The formula for one-way analysis of variance (ANOVA) is the following:

$$F = \frac{(MS\ between)}{(MS\ withing)} \qquad (2)$$

where **(MS between)** –the mean square of the between-group variations; **(MS withing)** – mean square of within-group variations.

c. The following formula is used to determine the standard deviation (C) for each group:

$$S = \sqrt{\frac{\sum (X_i - \bar{X})^2}{(N-1)}} \qquad (3)$$

where X_i — the value of each level of the component, $\bar{X}$ —the average value of the levels of formation of the component, N —the number of observations (in this case, the number of students in each group).

Ethical criteria

Generally accepted principles of academic integrity and respect for the individual were observed at all stages of the research. The work is not aimed at discrediting and was carried out for research purposes only. The main criteria for choosing methods and tools were professionalism, reliability, and verification of the obtained results. The respondents gave their informed written consent to the processing of their personal data and the distribution of the research results. The authors declare that they have not received any funding from interested parties. The authors of the study declare that they have no conflict of interest and involvement in the issues covered in this study.

Results

At the first stage, the gender roles of the respondents were determined using the TMF scale. At this stage, all respondents were conditionally divided into two groups — men and women. The results obtained during the study are presented in **table I**.

Analysis of the research results shows significant differences in the distribution of feminine, masculine, and androgynous traits among women and men. The majority of women (73%) demonstrate feminine traits, while only 27% of men demonstrate these traits, reflecting traditional gender expectations. However, masculine features are more pronounced among men, corresponding to 72%, while only 28% of women have such features. Androgyny is manifested equally in both groups (25% each), which indicates a diversity of gender traits among both sexes. Femininity-dominant Group 1 consists of 150 women and 53 men, making a total of 203 people. Masculinity-dominant Group 2 includes 57 women and 140 men, a total of 197 people. Androgyny-dominant Group 3 includes 51 women and 49 men, a total of 100 people.

The next step of the research was to assess the EI of the respondents of the three groups. The Hall Emotional Intelligence test was used for this purpose. The obtained results are presented in **table II**.

According to the obtained data, androgyny-dominant Group 3 demonstrated the highest EI on all scales, such as self-esteem, self-regulation, social awareness, and relationship management. For all indicators, femininity-dominant Group 1 with predominant femininity has average values, while masculinity-dominant Group 2 has the lowest average values. F-test confirm statistically significant differences between groups, especially for self-regulation values and the total EI score.

The obtained results may be related to the fact that androgyny, which combines both feminine and masculine traits, provides greater flexibility in social and emotional situations. Such features allow androgynous people to have better self-regulation and communication skills. In turn, this has a positive effect on their overall EI, because they are more focused on socially determined roles, groups with predominant femininity and masculinity may have limitations in the EI development, which may reduce their flexibility in various life situations. The next stage provided for the study of the respondents' coping strategies. The obtained results are presented in **table III**.

The results of the table show that there are statistically significant differences between the groups in coping strategies for overcoming stress. In particular, Group 1 shows a higher Self-esteem and a Total EI score compared to other groups, which indicates a better ability of this group to overcome stress. At the same time, the differences on the Self-regulation and Relationship Management scales between the groups are not statistically significant, which may indicate the similarity of these aspects between the groups. The identified differences may be related to the different level of EI development and personal characteristics in different groups.

Table I: Study of femininity/masculinity of respondents of both biological sexes (sample size 400 people).

Characteristic	Women (in %)	Men (in %)	Mean Square Deviation (Women)	Mean Square Deviation (Men)
Expression of feminine features	73	27	10	12
Expression of masculine features	28	72	12	10
Androgyny	25	25	15	15

Source: created on the basis of the obtained research results

Table II: Evaluation of EI in three groups of respondents.

Group	Scale	Mean value	Standard deviation
1	Self-esteem	3.5	0.8
	Self-regulation	4.2	0.6
	Social awareness	3.8	0.7
	Relationship management	4.0	0.9
	Total EI score	3.875	0.8
2	Self-esteem	3.2	0.9
	Self-regulation	3.8	0.7
	Social awareness	3.5	0.8
	Relationship management	3.7	0.6
	Total EI score	3.55	0.75
3	Self-esteem	4.0	0.5
	Self-regulation	4.5	0.4
	Social awareness	4.2	0.6
	Relationship management	4.3	0.5
	Social consciousness		
	Total EI score	4.25	0.5
F-test (ANOVA)			
Self-esteem	5.23	$p < 0.05$	
Self-regulation	12.45	$p < 0.01$	
Social awareness	7.89	$p < 0.05$	
Relationship management	9.12	$p < 0.01$	
Total EI score	10.34	$p < 0.01$	

Source: created on the basis of the obtained research results

Table III: Study of coping strategies for overcoming stress by respondents.

Scale	Group 1 (Mean ± CO)	Group 2 (Mean ± CO)	Group 3 (Mean ± CO)	F	p
Self-esteem	3.5 ± 0.8	2.9 ± 0.6	3.2 ± 0.7	4.23	0.02*
Self-regulation	4.1 ± 0.9	3.8 ± 1.1	3.6 ± 0.8	2.56	0.08
Social awareness	3.9 ± 0.5	3.4 ± 0.6	3.7 ± 0.4	3.12	0.05*
Relationship management	3.7 ± 0.7	3.2 ± 0.9	3.5 ± 0.6	2.87	0.06
Total EI score	3.8 ± 0.7	3.3 ± 0.8	3.5 ± 0.6	3.54	0.04*

Source: created on the basis of the obtained research results.

Discussion

The article presents a comprehensive analysis of various aspects of stress management and coping strategies in three groups of respondents, differing by gender. The work provides the assessment of femininity and masculinity, EI and coping strategies, giving grounds for several important observations. First of all, the research results show a clear distinction between three groups of respondents: femininity-dominant, masculinity-dominant, and androgyny-dominant. These differences can be observed in the values of mean femininity and masculinity scores, as well as in the androgyny level, which confirms specific gender characteristics in each group. Clear differences between groups with different gender identities are observed by Stanley et al.[19] and Casto et al.[20] The researchers demonstrate these differences based on various psychological indicators.

The femininity-dominant group, which includes 150 women and 53 men, has high levels of feminine traits and lower levels of masculinity. There are more women in this group, which logically correlates with high femininity indicators. The masculinity-dominant group, consisting of 57 women and 140 men, shows a predominance of masculine traits, consistent with the greater number of men in this group. Finally, the androgyny-dominant group, comprising 51 women and 49 men, shows a balanced combination of feminine and masculine traits. In contrast to this study, works by Scarcelli and Farci[21] and Silva[22] demonstrate a different distribution of gender roles. In their limitations of the study, the authors indicated that the distribution of gender roles depends on the environment in which a person develops, on his cultural, moral, ethical, and religious characteristics, etc.

Analysis of the EI assessment results shows significant differences between the groups. Androgyny-dominant respondents score highest on all EI scales, including Self-esteem, Self-regulation, Social Awareness, and Relationship Management. The data suggest that respondents with more balanced gender traits better develop emotional skills, which helps them to manage their emotions and relationships more effectively. The femininity-dominant group also scores high, especially in Self-esteem and Relationship Management, although Self-regulation and Social Awareness scores are slightly lower than the androgyny-dominant group. The masculinity-dominant group has lower results on all scales, which may indicate some difficulties in managing emotions and relationships characteristic of this group. Instead, Burbaitė et al.[23] and Zhylin et al.[24] note a more or less uniform distribution of the EI level according to the standard distribution law without any gender-specific features.

Analysis of coping strategies shows differences between groups. The femininity-dominant group has the highest mean values on the Self-esteem and Social Awareness scales, which indicates that representatives of this group are more prone to effective introspection and awareness of their emotions, which can contribute to better stress management. These results are consistent with the data obtained in the studies of Algorani and Gupta[25], Sharma and Gupta[26]. The authors also note a positive correlation of coping strategies with gender identity.

In turn, the masculinity-dominant respondents had the lowest average values of Self-esteem and Social Awareness, which may indicate a less effective use of stress coping strategies. This may be related to traditional masculine stereotypes that often limit openness to self-reflection and emotional awareness. The androgyny-dominant group shows average values that are mostly between the other two groups. The data suggest that balanced gender traits allow this group to adapt a variety of stress coping strategies that are more flexible and adaptive. The balance of gender traits and the selection of effective coping strategies are discussed in the works of Elomaa et al.[27] and Loo and Ho[28].

The study of coping strategies in combination with the EI assessment allows for a better understanding of the influence of gender identity on the effectiveness of coping with stress through communication. The results can be used to develop personalized approaches in stress management training that take into account the gender characteristics of the respondents.

Since EI is an important component in coping with stress because it directly determines the ability to communicate effectively, organizations can implement programs aimed at increasing emotional literacy among their employees, which can improve overall performance and well-being. Such interventions may include teaching self-regulation techniques and developing social skills that can help people better adapt to stressful situations regardless of their gender.

It is worth noting that the study has certain limitations, in particular, it is based on self-reported data, which may be subject to bias. Further research should include objective measures of stress and EI levels, as well as investigating the influence of other cultural and social factors on coping strategies through communication.

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Conclusions

Relevance
The obtained data are of great importance because they reveal the influence of gender-specific features on EI and stress coping strategies. The revealed differences in EI levels between femininity-dominant, masculinity-dominant and androgyny-dominant groups emphasize the importance of considering gender aspects in the development of support and training programmes. In particular, the high performance of the androgyny-dominant group may indicate effective coping and regulatory strategies that may be useful for other groups.

Findings
The obtained results of the study demonstrate significant differences in the EI levels and stress coping strategies between different groups of respondents, who are classified according to predominant femininity, masculinity and androgyny. The femininity-dominant respondents showed the highest mean values for Self-esteem, Social Awareness, and Relationship Management, although their Self-regulation scores were slightly lower. This suggests stronger interpersonal management and social perception skills, but a need for improved self-regulation. The masculinity-dominant group, on the contrary, shows lower results in all EI aspects compared to other groups, which may indicate the need to develop stress management strategies and emotional regulation in men with dominant masculinity. Applications. The obtained results can be used to improve psychological counselling, development of educational programmes, adaptation of management strategies and clinical practice. Understanding gender differences in EI and stress coping strategies allows creating individualized approaches, developing specialized training, and improving support and treatment methods.

Research prospects
Further research may focus on further examining the impact of gender differences on coping strategies and EI in different cultural contexts. It is also worth studying the effectiveness of interventions aimed at improving emotional regulation and adaptation to stress, taking into account gender-specific features.

Conflict of Interest
The authors declared that there is no conflict of interest

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ORIGINAL

Association between sociodemographic variables, healthy habits and stress with insulin resistance risk scales

Asociación entre variables sociodemográficas, hábitos saludables y estrés con escalas de riesgo de resistencia a la insulina

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Abstract

Introduction: Insulin resistance (IR) is a multifactorial clinical condition that contributes to the development of various pathological processes. This study aims to assess the associations between different sociodemographic variables, healthy habits, and stress with the values of three IR risk scales.

Materials and Methods: A descriptive cross-sectional study was conducted with 24,224 Spanish workers, evaluating how sociodemographic variables (age, gender, and socioeconomic status), healthy habits (smoking, alcohol consumption, physical activity, and adherence to the Mediterranean diet), and stress correlate with IR risk scales such as the triglyceride-glucose index (TyG), the metabolic IR scale (METS-IR), and the single-point insulin sensitivity estimator (SPISE-IR).

Results: All the variables studied showed associations with the values of the three IR risk scales, with the highest odds ratios observed for age and gender.

Conclusions: According to our results, the IR risk profile would be characterized by an older male, from a lower socioeconomic status, who smokes, consumes significant amounts of alcohol, is sedentary, has low adherence to the Mediterranean diet, and experiences stress.

Key words: Insulin resistance, sociodemographic variables, alcohol consumption, stress, TyG index, METS-IR, SPISE-IR.

Resumen

Introducción: La resistencia a la insulina (RI) es una entidad clínica multifactorial que está en la génesis de diversos procesos patológicos. El objetivo de este estudio es valorar como se asocian diferentes variables sociodemográficas, hábitos saludables y estrés con los valores de tres escalas de riesgo de RI.

Material y métodos: Se realiza un estudio descriptivo y transversal en 24224 trabajadores españoles en los que se valora como se asocian variables sociodemográficas (edad, género y estatus socioeconómico), hábitos saludables (tabaco, alcohol, ejercicio físico y dieta mediterránea) y estrés con escalas de riesgo de RI como el índice triglicéridos glucosa, la escala metabólica de RI (METS-IR) y el estimador de sensibilidad a la insulina de un solo punto (SPISE-IR).

Resultados: Todas las variables estudiadas muestran asociación con los valores de las tres escalas de RI, las odss ratio más altas se observan para edad y género.

Conclusiones: Según nuestros resultados el perfil de riesgo de RI sería un varón, de edad avanzada, perteneciente al estatus socioeconómico más desfavorecido, fumador, consumidor importante de alcohol, sedentario, con baja adherencia a la dieta mediterránea y con estrés.

Palabras clave: Resistencia a la insulina, variables sociodemográficas, consumo de alcohol, estrés, TyG index, METS-IR, SPISE-IR.

Introduction

Insulin resistance (IR) is a metabolic disorder in which peripheral tissues, particularly skeletal muscle, the liver, and adipose tissue, lose their ability to respond efficiently to insulin[1]. This condition has gained significant attention over the past decade due to its central role in the development of various metabolic diseases and its substantial contribution to the global burden of chronic non-communicable diseases[2]. Clinically, IR is closely associated with type 2 diabetes mellitus (T2DM), obesity, metabolic syndrome, and a range of cardiovascular diseases, underscoring the importance of understanding its mechanisms, risk factors, and diagnostic methods[3].

Insulin is a peptide hormone produced by the β-cells of the pancreatic islets of Langerhans, essential for regulating blood glucose homeostasis. It facilitates glucose uptake in peripheral tissues, promotes glycogen storage in the liver and skeletal muscle, and regulates lipolysis in adipose tissue[4]. IR occurs when, despite normal or elevated insulin levels, cells cannot adequately respond to the insulin signal. This inefficiency forces the pancreas to produce additional insulin in a compensatory attempt to maintain normoglycemia. However, this overproduction is unsustainable, and many individuals ultimately develop hyperglycemia, which over time contributes to the onset of type 2 diabetes[5].

IR has a significant and rising prevalence worldwide, a trend closely linked to the global increase in obesity and sedentary lifestyles[6]. In the United States and Europe, it is estimated that up to one-third of adults have some degree of IR. This prevalence is higher among individuals with obesity, and the risk increases proportionally with the accumulation of adipose tissue, particularly abdominal or visceral obesity, which is identified as a high-risk factor for IR development. Globally, IR rates are also rising in developing countries such as China, Brazil, and Mexico, where dietary transitions toward high-calorie foods and reduced physical activity have led to increased obesity rates and, consequently, IR[7].

The impact of IR is not limited to adults. Recent studies have shown a considerable increase in IR prevalence among children and adolescents, largely correlating with rising rates of overweight and childhood obesity. This shift in the epidemiology of IR in younger populations is concerning not only for child health but also for its long-term effects, as young people with IR are at much higher risk of developing T2DM, cardiovascular disease, and other metabolic comorbidities in adulthood[8].

The pathophysiology of IR is complex and multifactorial, involving a series of dynamic molecular and cellular mechanisms. At the cellular level, insulin signaling begins when the hormone binds to its specific receptor on the plasma membrane of target cells. This event triggers a signaling cascade, including the phosphorylation of several intracellular mediators, notably the phosphoinositide 3-kinase (PI3K)[9] pathway and protein kinase B (AKT)[10], both essential for the translocation of glucose transporters like GLUT4 to the cell surface, facilitating glucose uptake[11].

In IR conditions, this signaling process is disrupted by several factors, including chronic low-grade inflammation, elevated circulating free fatty acids, and lipid accumulation in peripheral tissues[12]. Chronic inflammation is exacerbated by the release of pro-inflammatory cytokines, such as tumor necrosis factor-alpha (TNF-α)[13] and interleukin-6 (IL-6)[14], which interfere with insulin signaling mechanisms. Additionally, the accumulation of free fatty acids and lipids in muscle and liver disrupts insulin signaling through lipotoxicity and oxidative stress[15].

Insulin resistance is also frequently accompanied by mitochondrial dysfunction and endoplasmic reticulum stress, further exacerbating insulin signaling alterations. These interconnected pathophysiological mechanisms create a vicious cycle that contributes to the progression of IR and its metabolic complications, highlighting IR's complexity as a multifactorial disorder involving both genetic and environmental factors[16].

Diagnosis of IR in clinical practice and research faces several challenges, largely due to the lack of a universally accepted method and the complexity of assessing insulin sensitivity. However, several direct and indirect methods are used to evaluate IR. The euglycemic-hyperinsulinemic clamp is considered the reference or "gold standard" for measuring insulin sensitivity. This procedure involves the continuous infusion of insulin and glucose at controlled rates, allowing for the evaluation of the amount of glucose needed to maintain normoglycemia under constant hyperinsulinemia. While this technique provides an accurate measure of insulin sensitivity, its use is limited outside research settings due to its complexity, high cost, and resource requirements[17].

In clinical practice, less complex indirect methods are commonly used to estimate IR, with the Homeostatic Model Assessment for Insulin Resistance (HOMA-IR), calculated from fasting glucose and insulin levels, being one of the most widely applied[18]. Other indices, such as the Matsuda insulin sensitivity index[19] and the Quantitative Insulin Sensitivity Check Index (QUICKI)[20], are also employed and validated across different populations. These methods are practical and accessible for monitoring IR in clinical settings, though they are less precise than the euglycemic-hyperinsulinemic clamp. Indices like the triglyceride-glucose (TyG) index[21], the metabolic score for IR (METS-IR)[22], and the single-point insulin sensitivity estimator (SPISE-IR)[23] have gained popularity due to their simplicity and good correlation with reference methods.

The clinical implications of IR are broad and significant, as it is a major risk factor for various chronic diseases. The relationship between IR and type 2 diabetes mellitus is particularly relevant, given that nearly 90% of individuals with T2DM have some degree of IR. This disorder is one of the main pathophysiological pathways contributing to diabetes progression in predisposed individuals, and once chronic hyperglycemia is established, the risk of microvascular and macrovascular complications increases considerably[24].

IR also plays a central role in the development of metabolic syndrome, a constellation of risk factors including central obesity, dyslipidemia, hypertension, and hyperglycemia[25]. This syndrome is associated with a significantly higher risk of cardiovascular disease and mortality, highlighting the relevance of IR in the pathogenesis of atherosclerotic disease and other cardiovascular complications. In patients with IR, an atherogenic lipid profile is commonly observed, characterized by elevated triglycerides and low-density lipoproteins (LDL), along with reduced high-density lipoproteins (HDL). Moreover, endothelial dysfunction and arterial stiffness, both consequences of IR, contribute to the development of hypertension and other cardiovascular disorders[26].

The objective of this study is to understand how certain sociodemographic variables, health habits, and stress are associated with the risk of insulin resistance as determined by the TyG index, METS-IR, and SPISE-IR.

Material and methods

Our research utilized an observational, cross-sectional, and descriptive study design, involving 24,224 workers from various labor sectors across different regions of Spain. The sample included 12,536 men and 11,688 women, selected from among those who participated in their companies' mandatory annual medical exams, which were conducted as part of the study. Data collection occurred between January 2019 and June 2020.

All analytical, anthropometric, and clinical variables were collected by health professionals from the participating companies, with protocols standardized to minimize inter-observer bias.

The following inclusion criteria were applied:

• Age between 18 and 69 years (working age).
• Employment in one of the participating companies, without temporary incapacity at the time of data collection.
• Availability of all variables required to calculate different cardiovascular risk scores.
• Agreement to participate in the study and consent to data use for epidemiological research.

Participant selection for both studies is shown in the flow chart (**Figure 1**).

Figure 1: Flow chart of the participants.
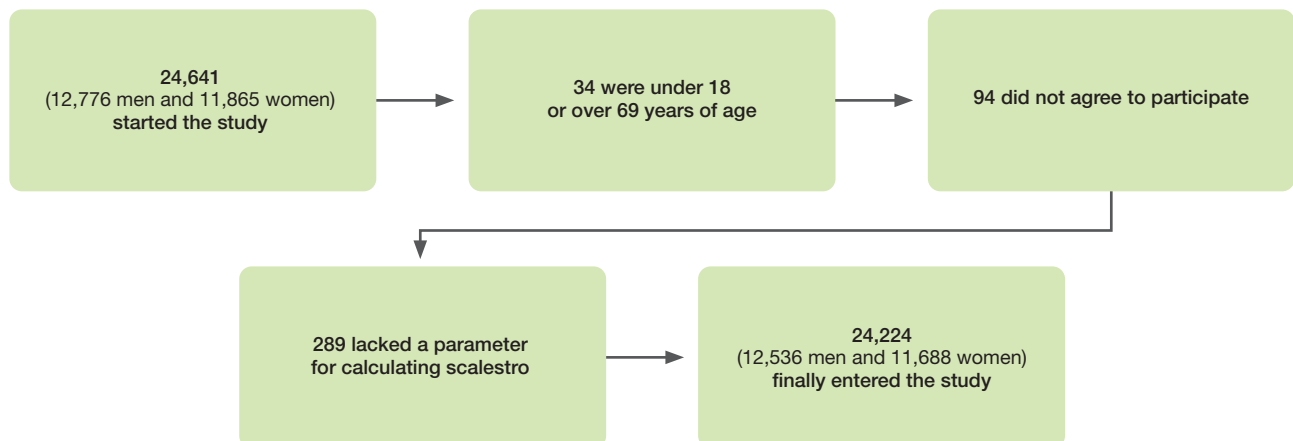
Determination of variables

The occupational health staff of the companies participating in the study was responsible for collecting the necessary data through:

• Medical History: A detailed record was gathered that included sociodemographic data (age, gender, type of occupation) and health-related factors, such as tobacco use, physical activity, adherence to the Mediterranean diet, and stress levels.
• Physical and Clinical Measurements: Measurements of height, weight, waist and hip circumference, as well as systolic and diastolic blood pressure, were recorded.
• Laboratory Analysis: Tests were conducted to obtain lipid profiles and blood glucose levels.

To avoid bias, measurement techniques were standardized. Height and weight were measured using a SECA 700 scale and a SECA 220 stadiometer, with participants in their underwear, following international ISAK standards. Values were recorded in centimeters and kilograms.

Waist circumference was measured with a SECA measuring tape, positioned between the last rib and the iliac crest, with participants standing and relaxed. Hip circumference was measured similarly, placing the tape at the widest part of the buttocks.

Blood pressure was measured using an OMRON-M3 sphygmomanometer. Participants were seated, rested for 10 minutes, with their arm at heart level, legs uncrossed, and without having consumed food, tobacco, alcohol, or tea in the past hour. Three measurements were taken at one-minute intervals, and the average was recorded as the final value.

Blood samples were obtained by venipuncture after a 12-hour fast, processed, and refrigerated for a maximum of 48 to 72 hours. Analyses were performed in reference laboratories using standardized methods: triglycerides, total cholesterol, and glucose were measured enzymatically, while HDL was assessed through precipitation methods. LDL was calculated using the Friedewald formula when triglycerides were below 400 mg/dL; if higher, it was measured directly. Analytical variables were expressed in mg/dL.

The insulin resistance risk scales listed below were applied:

- TyG index[27]. TyG= LN (triglycerides x glycaemia/2) is considered high risk at 8.5
- Metabolic score for insulin resistance (METS-IR)[28]. METS-IR = Ln(2 × glucose) + triglycerides × BMI)/ (Ln(HDL-c). High values are defined as 50 and above.
- Single-Point insulin Sensitivity estimator (SPISE-IR). SPISE = $(=600 \times HDL^{0.185}/triglycerides^{0.2} \times BMI^{1.338})$. SPISE-IR[29] = 10/SPISE is considered high risk at 1.51

The job category was determined based on the recommendation of the Spanish Society of Epidemiology, using the 2011 National Classification of Occupations: non-manual workers include executives and university professionals, while the rest are classified as manual workers[30].

To determine smoking habits, individuals were classified as smokers if they had consumed at least one cigarette daily (or its equivalent) in the past thirty days or had quit smoking less than a year ago.

Table I: Characteristics of the population.

	Men n=12536	Women n=11688	
	Mean (SD)	Mean (SD)	p-value
Age (years)	45.8 (8.6)	44.0 (8.7)	<0.001
Height (cm)	173.5 (6.7)	161.7 (6.1)	<0.001
Weight (kg)	82.3 (13.5)	66.1 (12.7)	<0.001
Waist circumference (cm)	96.0 (10.7)	88.5 (15.0)	<0.001
Hip circumference (cm)	105.7 (10.3)	103.6 (12.2)	<0.001
Systolic blood pressure (mmHg)	134.5 (18.5)	122.0 (16.9)	<0.001
Diastolic blood pressure (mmHg)	81.2 (11.7)	75.4 (10.9)	<0.001
Total cholesterol (mg/dL)	201.9 (38.9)	196.2 (35.2)	<0.001
HDL-cholesterol (mg/dL)	50.7 (11.3)	60.0 (12.8)	<0.001
LDL-cholesterol (mg/dL)	125.8 (44.6)	118.5 (31.2)	<0.001
Triglycerides (mg/dL)	129.9 (89.0)	88.6 (51.8)	<0.001
Glucose (mg/dL)	94.8 (21.7)	89.3 (16.6)	<0.001
	%	%	p-value
< 30 years	3.8	6.7	<0.001
30-39 years	19.8	21.5	
40-49 years	39.3	45.5	
50-69 years	37.1	26.3	
White collar	6.8	80.7	<0.001
Blue collar	93.2	19.3	
Non smokers	71.5	73.9	<0.001
Smokers	28.5	26.1	
Non physical activity	47.5	49.9	<0.001
Yes physical activity	52.5	50.1	
Non Mediterranean diet	49.5	43.1	<0.001
Yes Mediterranean diet	50.5	56.9	
Non alcohol consumption	60.3	78.3	<0.001
Yes alcohol consumption	39.7	21.7	
Non stress	76.2	83.8	<0.001
Yes stress	23.8	16.2	

HDL High density lipoprotein. LDL Low density lipoprotein. SD Standard deviation.

Alcohol consumption was quantified using standard drink units, the reference method at all levels of care. This system allows for a quick measurement of alcohol intake, converting it to grams of pure alcohol. In Spain, one standard drink unit equals 10 grams of alcohol, equivalent to a glass of wine (100 ml), champagne (100 ml), or beer (200 ml), and half a measure of spirits or cocktails (25 ml). Exceeding 35 standard units per week for men and 20 for women poses a significant long-term health risk[31].

Adherence to the Mediterranean diet was assessed using the PREDIMED questionnaire, consisting of 14 questions with scores of 0 or 1. A score of nine or higher indicated high adherence[32].

Physical activity was evaluated with the International Physical Activity Questionnaire (IPAQ), which examines the frequency, duration, and intensity of physical activity in the last seven days, including time spent walking and sitting[33].

Stress levels were assessed using Cohen's Perceived Stress Scale (PSS), a widely used 10-item tool for measuring daily stress across various cultural contexts[34].

Statistical Analysis

A descriptive analysis of categorical variables was conducted using frequencies and distributions. Normality of the sample was tested, and the mean and standard deviation were calculated for quantitative variables. Bivariate associations were analyzed with Student's t-test and the chi-square test for proportions. Variables associated with atherogenic risk were analyzed using multinomial logistic regression and the Hosmer-Lemeshow goodness-of-fit test. SPSS software version 29.0 was used for all statistical analyses, with a significance level of 0.05.

Ethical Considerations

The study adhered to the ethical guidelines of the Declaration of Helsinki. Approval was obtained from the Ethics and Research Committee of the Balearic Islands (CEI-IB), under identifier IB 4383/20. Participants provided written and verbal consent after receiving detailed information on the study's objectives.

To protect confidentiality, data were stored with unique codes known only to the project coordinator, ensuring participant anonymity in reports. The team guaranteed

Table II: Mean values of insulin resistance risk scales According sociodemographic variables, healthy habits and stress by gender.

		TyG index		METS-IR		SPISE-IR	
Men	**n**	**Mean (SD)**	**p-value**	**Mean (SD)**	**p-value**	**Mean (SD)**	**p-value**
< 30 years 30-39 years 40-49 years 50-69 years	472 2484 4924 4656	8.09 (0.40) 8.36 (0.56) 8.56 (0.61) 8.69 (0.58)	<0.001	34.05 (5.77) 38.14 (7.17) 40.60 (8.19) 42.17 (7.66)	<0.001	1.37 (0.32) 1.63 (0.44) 1.79 (0.51) 1.87 (0.47)	<0.001
White collar Blue collar Non smokers Smokers	848 11688 8960 3576	8.40 (0.56) 8.56 (0.60) 8.50 (0.59) 8.68 (0.60)	<0.001	38.87 (7.99) 40.56 (7.94) 40.18 (7.79) 41.12 (8.31)	<0.001	1.64 (0.48) 1.78 (0.49) 1.75 (0.48) 1.83 (0.51)	<0.001
Non physical activity Yes physical activity	5952 6584	8.67 (0.61) 8.45 (0.57)	<0.001	42.31 (8.21) 38.76 (7.32)	<0.001	1.89 (0.51) 1.67 (0.44)	<0.001
Non Mediterranean diet Yes Mediterranean diet	6205 6331	8.63 (0.61) 8.49 (0.56)	<0.001	42.23 (8.20) 38.95 (7.36)	<0.001	1.84 (0.50) 1.71 (0.52)	<0.001
Non alcohol consumption Yes alcohol consumption	7556 4980	8.51 (0.61) 8.60 (0.58)	<0.001	39.83 (7.99) 41.38 (7.80)	<0.001	1.74 (0.50) 1.83 (0.47)	<0.001
Non stress Yes stress	9552 2984	8.52 (0.60) 8.64 (0.59)	<0.001	39.62 (7.67) 43.10 (8.26)	<0.001	1.73 (0.48) 1.92 (0.50)	<0.001
Women	**n**	**Media (dt)**	**p-value**	**Media (dt)**	**p-value**	**Media (dt)**	**p-value**
< 30 years 30-39 years 40-49 years 50-69 years	776 2516 5320 3076	7.98 (0.41) 8.03 (0.43) 8.13 (0.48) 8.39 (0.50)	<0.001	30.49 (5.88) 33.20 (7.55) 35.11 (7.77) 36.67 (8.16)	<0.001	1.20 (0.31) 1.35 (0.45) 1.46 (0.46) 1.58 (0.48)	<0.001
White collar Blue collar	2260 9428	7.98 (0.42) 8.21 (0.50)	<0.001	31.25 (6.61) 35.65 (7.94)	<0.001	1.23 (0.37) 1.50 (0.47)	<0.001
Non smokers Smokers	8640 3048	8.14 (0.50) 8.23 (0.47)	<0.001	34.63 (8.08) 35.28 (7.32)		1.44 (0.48) 1.47 (0.42)	<0.001
Non physical activity Yes physical activity	5840 5848	8.23 (0.51) 8.10 (0.46)	<0.001	36.54 (8.39) 33.07 (6.94)	<0.001	1.55 (0.50) 1.35 (0.40)	<0.001
Non Mediterranean diet Yes Mediterranean diet	5038 6650	8.20 (0.50) 8.12 (0.47)	<0.001	36.40 (8.37) 33.16 (6.95)	<0.001	1.50 (0.51) 1.38 (0.40)	<0.001
Non alcohol consumption Yes alcohol consumption	9152 2536	8.12 (0.48) 8.31 (0.49)	<0.001	37.61 (8.75) 34.02 (7.45)	<0.001	1.62 (0.52) 1.40 (0.44)	<0.001
Non stress Yes stress	9800 1888	8.15 (0.49) 8.25 (0.48)	<0.001	37.36 (7.46) 37.07 (9.50)	<0.001	1.42 (0.44) 1.59 (0.56)	<0.001

TyG Triglyceride Glucose index. METS-IR Metabolic score for insulin resistance. SPISE-IR Single-Point insulin Sensitivity estimator. SD Standard deviation.

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Results

Table I provides an overview of the anthropometric and clinical data of the 24,224 workers (12,536 men and 11,688 women) in the study. The average age was 45 years, with most participants between 40 and 69 years old. Men demonstrated less favorable anthropometric, clinical, and analytical indicators. Manual laborers were the largest occupational group, and around 27% of participants were smokers (28.5% of men and 26.1% of women). More than half reported engaging in physical activity and following a Mediterranean diet, while alcohol intake and stress levels were notably higher in men. These differences were statistically significant (p < 0.001).

Tables II and **III** show the mean values and the prevalence of elevated values in the insulin resistance (IR) risk scales according to sociodemographic variables, healthy habits, and stress. In both tables, the same trend is observed: an increase in the values of the IR risk scales as age increases, as socioeconomic status decreases, with the presence of unhealthy habits (smoking, alcohol consumption, sedentary lifestyle, and low adherence to the Mediterranean diet), or in the presence of stress. In all cases, the values are lower in women. The observed differences are statistically highly significant (p<0.001).

The results of the multinomial logistic regression are presented in **table IV**. The dependent variables are the IR risk scales, and the independent variables include age, gender, type of work, smoking, alcohol consumption, physical exercise, Mediterranean diet adherence, and stress. To identify any potential confounding variables, additional analyses were conducted by stratifying the variables included in the model; none were found to act as confounders. All analyzed variables showed an association with the IR risk scales (p<0.001), with the highest odds ratios corresponding to age and gender.

Table III: Prevalence of high values of insulin resistance risk scales According sociodemographic variables, healthy habits and stress by gender.

		TyG index high		METS-IR high		SPISE-IR high	
Men	**n**	**%**	**p-value**	**%**	**p-value**	**%**	**p-value**
< 30 years	472	4.24	<0.001	0.24	<0.001	0.21	<0.001
30-39 years	2484	21.25		8.37		10.47	
40-49 years	4924	30.95		12.84		18.60	
50-69 years	4656	39.78		15.46		22.51	
White collar	848	21.70	<0.001	12.66	<0.001	13.68	<0.001
Blue collar	11688	32.00		9.91		18.07	
Non smokers	8960	27.81		11.74		16.52	
Smokers	3576	40.04		14.32		20.92	
Non physical activity	5952	38.71	<0.001	17.54	<0.001	24.19	<0.001
Yes physical activity	6584	24.61		7.90		11.97	
Non Mediterranean diet	6205	36.41	<0.001	16.58	<0.001	23.20	<0.001
Yes Mediterranean diet	6331	25.92		8.83		13.89	
Non alcohol consumption	7556	30.44	<0.001	11.81	<0.001	16.89	<0.001
Yes alcohol consumption	4980	32.61		13.49		19.12	
Non stress	9552	29.33	<0.001	10.13	<0.001	15.22	<0.001
Yes stress	2984	37.60		19.97		25.94	
Women	**n**	**%**	**p-value**	**%**	**p-value**	**%**	**p-value**
< 30 years	776	3.61	<0.001	0.16	<0.001	0.11	<0.001
30-39 years	2516	7.15		3.97		5.09	
40-49 years	5320	11.43		4.89		6.02	
50-69 years	3076	32.59		7.28		10.40	
White collar	2260	6.37	<0.001	5.73	<0.001	3.01	<0.001
Blue collar	9428	15.15		1.95		7.42	
Non smokers	8640	12.87	<0.001	4.30	<0.001	5.91	<0.001
Smokers	3048	15.09		5.24		6.81	
Non physical activity	5840	16.58	<0.001	7.12	<0.001	8.84	<0.001
Yes physical activity	5848	10.33		2.87		4.31	
Non Mediterranean diet	5038	15.87	<0.001	6.87	<0.001	8.51	<0.001
Yes Mediterranean diet	6650	11.56		3.28		4.89	
Non alcohol consumption	9152	11.23	<0.001	3.76	<0.001	5.03	<0.001
Yes alcohol consumption	2536	21.45		9.46		12.15	
Non stress	9800	12.12	<0.001	4.08	<0.001	5.59	<0.001
Yes stress	1888	20.33		9.75		11.65	

TyG Triglyceride Glucose index. METS-IR Metabolic score for insulin resistance. SPISE-IR Single-Point insulin Sensitivity estimator.

Discussion

In our study, all analyzed variables are associated with IR risk scale values, particularly age and gender.

Age is a determining factor in IR, as insulin sensitivity tends to decline with aging in both men and women. This phenomenon is linked to a progressive decrease in muscle mass and function, an increase in visceral fat, and a tendency toward lower physical activity levels, all of which contribute to IR[35]. using TyG and METS-IR indices show that older individuals have elevated index values, indicating higher IR compared to younger adults[36]. These achanges not only affect insulin response but also promote a low-grade inflammatory state that exacerbates metabolic dysfunction. This "metabolic aging" suggests that age should be considered when interpreting IR indices and designing preventive interventions[37].

Gender also playcant role in modulating IR in our study, likely influenced by hormonal factors. Premenopausal women generally exhibit greater insulin sensitivity than men, attributed to the protective effects of estrogen. However, this advantage appears to diminish after menopause, with women experiencing increased IR and associated risk factors, such as abdominal fat gain and altered lipid profiles[38]. Studies using SPISE, an ind for insulin sensitivity, find that postmenopausal women have higher IR levels than men of the same age[39]. These findings suggest that IR indice adjusted for gender, as hormonal changes impact insulin sensitivity and its progression in both sexes.

Socioeconomic status (SES) is inversely associated with IR, where individuals of lower SES have a higher risk of developing IR, likely due to multiple related factors, such as less healthy diets, limited access to exercise resources, and higher levels of chronic stress. Studies using the TyG and METS-IR indices indicate that populations with low SES have higher IR values, associated with higher obesity prevalence and increased consumption of processed and sugary foods[40]. Limited access to healthcare and information onfestyles also plays a role in this association, highlighting the need for health policies that address socioeconomic inequalities in IR prevention.

In our study, smoking is a well-established risk factor for IR and metabolic diseases. Nicotine and other tobacco components negatively impact insulin sensitivity by promoting oxidative stress, chronic inflammation, and visceral fat accumulation, all of which contribute to IR[41]. Population studies show that smokers have elevated TyG anndices compared to non-smokers, indicating higher IR[42]. This implies that smoking should be considered an important factor opment and progression, and that IR indices can be useful for monitoring the metabolic effects of smoking across population groups.

Alcohol consumption in our study is associated with higher IR risk scale values, although the effects on IR are complex and not consistently reported in the literature. Evidence suggests that moderate alcohol consumption, particularly red wine, may have a protective effect on insulin sensitivity, possibly due to the antioxidants and polyphenols in wine, which improve lipid profiles and reduce inflammation[43]. However, excessive alcohol consumption has the opposite effect, as it is asso increased abdominal fat, dyslipidemia, and liver damage, all of which exacerbate IR[44]. Studies using TyG and METS-IR indicate that excessive drinkers have higher IR index valmoderate consumption does not significantly increase IR[45]. This finding suggests that alcohol consumption should be carefully considered in IR studies and weting IR index results across population subgroups.

Table IV: Multinomial logistic regression.

	TyG index high		METS-IR high		SPISE-IR high	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Women	1		1		1	
Men	2.63 (2.46-2.80)	<0.001	2.45 (2.21-2.69)	<0.001	2.78 (2.54-3.03)	<0.001
< 30 years	1		1		1	
30-39 years	1.71 (1.59-1.83)	<0.001	1.17 (1.13-1.22)	<0.001	1.28 (1.19-1.38)	<0.001
40-49 years	2.59 (2.35-2.84)	<0.001	1.52 (1.38-1.67)	<0.001	1.92 (1.69-2.16)	<0.001
50-69 years	8.58 (6.37-10.79)	<0.001	3.55 (3.05-4.06)	<0.001	9.23 (7.03-11.44)	<0.001
White collar	1		1		1	
Blue collar	1.31 (1.16-1.46)	<0.001	1.15 (1.10-1.21)	<0.001	1.17 (1.14-1.21)	<0.001
Non smokers	1		1		1	
Smokers	1.48 (1.38-1.58)	<0.001	1.19 (1.14-1.24)	<0.001	1,15 (1.11-1.19)	<0.001
Yes physical activity	1		1		1	
Non physical activity	1.63 (1.53-1.73)	<0.001	2.45 (2.22-2.69)	<0.001	2.18 (2.00-2.37)	<0.001
Yes Mediterranean diet	1		1		1	
Non Mediterranean diet	1.29 (1.20-1.39)	<0.001	1.92 (1.75-2.09)	<0.001	1.68 (1.51-1.86)	<0.001
Non alcohol consumption	1		1		1	
Yes alcohol consumption	1.19 (1.11-1.27)	<0.001	1.30 (1.23-1.37)	<0.001	1.28 (1.19-1.38)	<0.001
Non stress	1		1		1	
Yes stress	1.31 (1.21-1.41)	<0.001	2.03 (1.84-2.23)	<0.001	1.75 (1.60-1.91)	<0.001

TyG Triglyceride Glucose index. METS-IR Metabolic score for insulin resistance. SPISE-IR Single-Point insulin Sensitivity estimator. OR Odss ratio.

According to our results, the Mediterranean diet shows positive effects in reducing IR due to its high content of healthy fats (such as olive oil), fiber, antioxidants, and polyphenols found in fruits, vegetables, and whole grains. Several studies have shown that a diet rich in these components can improve insulin sensitivity and reduce inflammation and oxidative stress, both of which contribute to IR[46]. Individuals following a Mediterranean diet exhibit lower TyG and METS-IR index values, suggesting lower IR those following Western dietary patterns[47]. These findings support the use of the Mediterranean diet as a strategy for IR prevention and management and highlighty of IR indices for assessing dietary effects across populations.

Our results also suggest that physical exercise is an effective intervention to improve insulin sensitivity. Regular physical activity enhances glucose uptake in skeletal muscle and promotes a healthier body composition by reducing visceral fat, which translates to lower IR[48]. Longitudinal and cross-sectional studies have observed that physically active individuals have significantly lower TyG, METS-IR index values compared to sedentary individuals, supporting the beneficial effect of exercise on IR[49]. Physical exercise should be a central component in intervention programs aimed at reducing IR in high-risk populations, and IR indices cale tools for monitoring its benefits in clinical practice.

Chronic stress is another factor associated with IR in our research, likely due to the sustained activation of the hypothalamic-pituitary-adrenal axis, leading to increased cortisol release. Cortisol induces insulin resistance by raising hepatic glucose production and promoting abdominal fat accumulation[50]. Studies using TyG and METS-IR have found that individuals with high stress levels have elevated IR indices, suggesting that stress significantly coo IR pathophysiology[51]. This finding underscores the importance of incorporating stress management into comprehensive strategies for reducing IR and improving metabolic health.

Conclusions

In conclusion, factors such as age, gender, socioeconomic status, tobacco and alcohol consumption, Mediterranean diet adherence, physical exercise, and stress are significantly associated with IR. Risk indices such as TyG, METS-IR, and SPISE provide accessible and objective methods for assessing IR and its relationship with these factors in population studies. These findings suggest that personalized interventions, which consider individual and socio-environmental factors, could be more effective in preventing and managing IR and its associated complications. Furthermore, the use of these risk indices allows for practical, continuous assessment in clinical practice and research, facilitating the implementation of public health strategies and preventive measures.

Key strengths of this study include the large sample size and the extensive range of variables that can be associated with the analyzed IR risk scales.

As limitations, it should be noted that, as a cross-sectional study, causal relationships cannot be established. Another limitation is that insulin resistance was not determined using objective methods but rather through validated risk scales.

Conflict of Interest
The authors declared that there is no conflict of interest

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SPECIAL ARTICLE

Cancro de mama: análisis de la memoria médica redactada por el cirujano Bartolomé Budi en 1734

Breast cancer: analysis of the medical report written by surgeon Bartolomé Budi in 1734

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Resumen

El cáncer de mama es el tumor maligno más frecuente en el mundo, llegó a ser la primera causa de mortalidad en mujeres, instituyéndose como un problema de Salud Pública en los países desarrollados y en vías de desarrollo. En la actualidad, su mortalidad está disminuyendo, a pesar de registrarse una incidencia de la enfermedad en un continuo crecimiento.

Conocida la enfermedad desde la antigüedad, sus estrategias y abordaje terapéutico en el tiempo han evolucionado al ritmo de su comprensión, conocimiento y desarrollo científico-técnico de la medicina.

El análisis de un manuscrito redactado por el cirujano Bartolomé Budi en 1734, escasamente conocido hasta la fecha, cuya temática registra el abordaje médico de un cancro localizado en el pecho de una mujer de treinta años, permite obtener la visión del cirujano en la ciencia médica de la época, así como la problemática de cáncer de mama como enfermedad.

El estudio de la exposición del caso clínico muestra una interesante perspectiva epistemológica de la enfermedad, así como de sus causas, pronóstico, desarrollo clínico y abordaje terapéutico de interés histórico-científico.

Una obra que pone de manifiesto el destacado papel de los cirujanos en la descripción de nuevos enfoques curativos a principios del siglo XVIII, cuya relevancia, más el conocimiento anatómico, permitirá ampliar el arte de curar y será determinante en los progresos terapéuticos y los métodos de detección del cáncer de mama venideros.

Palabras clave: Bartolomé Budi, Cáncer de mama, Historia de la Medicina, Salud Pública, Siglo XVIII.

Abstract

Breast cancer as a disease is the most frequent malignant tumor in the world and has become the leading cause of mortality in women, establishing itself as a Public Health problem in developed and developing countries. At present, its mortality rate is decreasing despite a continuously increasing incidence of the disease.

The disease has been known since ancient times, its strategies and therapeutic approach have evolved over time at the pace of its understanding, knowledge and scientific-technical development of medicine.

The analysis of a manuscript written by the surgeon Bartolomé Budi in 1734, scarcely known to date, whose subject matter records the medical approach to a canker located in the breast of a thirty-year-old woman, allows us to obtain the surgeon's vision of the medical science of the time, as well as the problem of breast cancer as a disease.

The study of the clinical case exposition shows an interesting epistemological perspective of the disease, as well as its causes, prognosis, clinical development and therapeutic approach of historical-scientific interest.

A work that highlights the prominent role of surgeons in the description of new curative approaches in the early 18th century, whose relevance, plus the anatomical knowledge of the body, will allow to expand the art of healing and will be decisive in the therapeutic progress and detection methods of breast cancer to come.

Key words: Bartolome Budi, Breast cancer, History of medicine, Public Health, 18th century.

Introducción

El cáncer de mama constituye el tipo de neoplasia más frecuente a nivel mundial, así como una de las principales causa de mortalidad entre las mujeres de países en vías de desarrollo, frente a las altas tasas de supervivencia entre los países desarrollados, un comportamiento desigual motivado esencialmente por un diagnóstico tardío y la ausencia de tratamiento primario adecuado y personalizado[1].

En España, es el segundo tumor más diagnosticado tras el cáncer colorrectal[1]. Su incidencia en 2023 ascendió a 35.000 casos y representó el 30% del total de neoplasias malignas diagnosticadas en mujeres[2].

Aunque la incidencia en los últimos años ha experimentado un continuo crecimiento, su mortalidad está disminuyendo. Unos datos que reflejan las mejoras en las medidas preventivas y los avances terapeúticos[3].

A pesar de ello, el cáncer de mama constituye un problema de salud pública en el que convergen diversas especialidades biomédicas en su estudio y control, entre ellas, la historia de la ciencia, que investiga las creencias y aportaciones científicas de la enfermedad que han permitido fijar las estrategias para su detección, prevención y abordaje terapéutico del cáncer de mama en sus contextos históricos[4,5].

Por ello, el objetivo de este trabajo fue el análisis de una memoria médica redactada por Bartolomé Budi, cirujano mayor del Hospital de la Congregación de Naturales de San Pedro de Madrid[6,7], titulada "historia y curación de un cancro oculto en un pecho de una mujer de edad de treinta años, producido por supresión de la evacuación menstrual"[8]. Un manuscrito que permite obtener una interesante perspectiva epistemológica de la enfermedad, así como de sus causas, pronóstico y tratamiento a través de la exposición de un caso clínico de interés histórico-científico en la primera mitad del siglo XVIII.

Estructura y fuente documental

La memoria médica, poco conocida, fue elaborada y presentada como requisito de ingreso en calidad de miembro de la Tertulia Literaria Médico-Chymico-Phisica Matritense, actual Real Academia Médica de Madrid. Una postulación por la que fue admitido el profesor de cirugía, Bartolomé Budi, en sesión ordinaria del miércoles 1 de marzo de 1734, tal y como recoge en el acta de la misma el secretario de la tertulia, Joseph de Ortega[9].

El texto se conserva en el fondo documental de la Real Academia Nacional de Medicina, catalogado como: Madrid, 1-III-1734 Bartolomé Budi, "Cancro oculto en el pecho de una mujer"[8], y se compone por 15 folios manuscritos en tamaño cuartilla (22cm) distribuidos en dos bloques sin enunciar, ambos firmados por el propio cirujano.

Un primer bloque está conformado por las dos páginas iniciales dirigidas al secretario de la tertulia, Joseph de Ortega, exponiendo su deseo para que los socios fundadores debatan y evalúen el contenido científico del texto, un requisito necesario para su incorporación como miembro.

Un segundo apartado lo componen las trece páginas restantes, en ellas, el autor vertebra la historia clínica objeto de este estudio.

A pesar que el autor no estructura el contenido de la obra, su lectura permite distinguir cuatro bloques bien diferenciadas, a través de las cuales, se aborda la etiología y patogénesis de la enfermedad, su descripción, los tipos de cancros y causas a las que se asocia su aparición y/o desarrollo (páginas 3 a 8), desarrolla el pronóstico y los distintos tipos de tratamiento de la enfermedad (página 8 a 11), continúa exponiendo los beneficios de la cirugía y la descripción de la intervención practicada (páginas 11 a 14), para concluir con varios ejemplos de intervenciones previas en la última página (página 15).

Un cancro oculto y adherido en las partículas glandulosas del pecho

"Y antes de todo es necesario definir el cancro, porque sin la definición no podemos venir en conocimiento de la enfermedad que intentamos curar, porque la definición es el alma de la curación, porque ella nos explica por medio de sus predicados esenciales, la naturaleza del indicante que es la enfermedad. Y todas las veces que no tengamos un pleno conocimiento de la enfermedad que tenemos que curar, es evidente que quedaremos burlados en la aplicación del indicado que es el remedio. Y supuesto esto, digo que el cancro es una enfermedad cruel, y oprobio de los cirujanos"[8].

De este modo, poniendo en valor la importancia de un correcto diagnóstico, iniciaba su disertación el profesor de cirugía, Bartolome Budi.

El autor destaca las dificultades para obtener desenlaces terapéuticos favorables, llegando a tildar a la enfermedad como la ignominia de la especialidad.

Una percepción letal vigente desde las recomendaciones recogidas en la colección de es-critos médicos de Hipócrates (460-377 a C), Corpus Hipocraticum, un dogma práctico-filosófico en el que médicos y cirujanos obtenían la inspiración para abordar el ejercicio de su profesión[10,11].

A Hipócrates se le atribuye el primer uso etimológico al describir en sus textos unas lesiones ulcerosas crónicas[12], entendiendo la enfermedad como mortal e irremediable. "Los que tienen cancros ocultos, mejor es no curarlos, porque curándolos, mueren presto, pero sin curarlos viven más largo tiempo"[11].

Un planteamiento presente en la definición de la enfermedad por Budi, quien "como el común de los autores, definen el cancro oculto por ser un tumor libido, duro en el principio parvo, doloroso y adherido en las partículas glandulosas o globulosas del pecho. Circundando de unas venas tupidas y lívidas asimiladas a los pies del cangrejo fluvial o marino que es de donde se deriva el nombre de cancro"[8].

En función al grado de exposición del tumor, el cirujano detalla los tipos de cancros en "oculto, manifiesto, ulcerado y no ulcerado"[7], aclarando que "las partes afectas son por lo común en los varones labios y narices. Y en las hembras las mamilas"[8].

Respecto a la causa de la enfermedad, explica que el origen de la patología se debe a tres causas, "primitiva, antecedentes y conjunta"[8], centrándose en las dos primeras.

Como causa primitiva, asocia las "contusiones de las glándulas y opresiones de sus túbulos, por cuya causa se obstruyen, de cuya obstrucción resulta estancarse la linfa, y adquiriendo fermentación peregrina, se viste de unas sales acidas las que devorando dichas glándulas producen el tumor cancroso"[8].

Para el segundo, antecedentes, relaciona "haber faltado intempestivamente del periódico circulo menstrual, la cual evacuación supresa o diminuta, suele ser frecuente causa de que se produzcan cancros en las mamilas de las mujeres, como lo advirtió Hipócrates, que dice que no menstruando las mujeres, se hacen sus cuerpos enfermos y esto proviene del grande consentimiento que el útero tiene con dichas mamilas, las cuales reciben prontamente la sangre viciada. (…) de ella resulta una sangre saturada de sal ácido y corrosiva con movimiento lento, de cuyo lentor resulta saturarse la bilis de unas sales ocres y mordaces, de cuya mordacidad, queda envainada la linfa u otra bilis, en los túbulos glandulosos. Y adquiriendo de día en día tal acritud que corren y destruyen la textura de las glándulas, por cuya causa resulta el tumor cancroso"[8].

Una teoría humoral dictada por el propio Hipócrates que consideraba como causa de la enfermedad la ruptura del equilibrio entre los humores corporales: sangre, bilis negra, bilis amarilla y flema[12,13]. Que en este caso se asociaba a un exceso de bilis negra, también denominada como "atrabilis".

Un planteamiento defendido por sus coetáneos, como el médico de la familia real y profesor de anatomía, Pedro Martín Martínez, quien tuvo un papel determinante en la renovación de la medicina y cirugía en España, y que en su obra, <Cirugía moderna>, publicada en 1722, destacó como "la causa del cáncer es la atrabile, un ácido corrosivo y de naturaleza arsenical (…), este ácido maligno en el principio está oculto y enredado, hasta que con el tiempo fermentado, se desenreda y explica, ulcerando la parte"[14]. Una teoría compartida en 1729 por Joseph Pradillo, cirujano real y miembro de la Regia Sociedad Medico-Chimica de Sevilla, quien subrayaba que "la causa del cancro es lo que llamamos atrabilis, que es un humor ácido fermentativo"[15].

La teoría humoral constituyó el paradigma científico hasta el siglo XVIII, pero las bases iniciadas en el humanismo empezaron a dinamizar el estudio de la medicina como consecuencia de un cambio en la percepción del cuerpo humano, el cual comienza a perder su sacralidad convirtiéndose en un campo de exploración, preludio del nacimiento de la medicina moderna[16-19].

Bajo este contexto y tras el descubrimiento de la circulación sanguínea por William Harvey (1578-1657), así como el sistema linfático por Rudbeck (1630-1708), se empezó a cuestionar la teoría humoral, que convivirá con la teoría linfática como la causa de la enfermedad[16,20]. Así, Stahl (1660-1734) teorizaría que el cáncer era el resultado de la fer-mentación y degeneración de la linfa, haciendo que variase su densidad, acidez y alcalinidad[16,17].

En esta línea de conocimiento, el cirujano y anatomista inglés, John Hunter (1728-1793), proponía que el cáncer de mama se debía a la coagulación defectuosa en los vasos linfáticos, indicándose la extirpación de los ganglios linfáticos afectados[16,19].

En 1757, el cirujano francés Henry François LeDran (1685-1770), concluía que la enfermedad tiene un origen local en sus estadios tempranos, no sistémica, y que puede diseminarse por el sistema linfático. Indicando el abordaje quirúrgico antes de su expansión a los ganglios linfáticos de las axilas[20,21].

Poco a poco se van ampliando los conocimientos sobre la enfermedad tumoral de mama, su importancia y difusión por vía linfática a la región ganglionar axilar, asociándose este último como un signo de pronóstico de mayor gravedad frente a los pacientes sin diseminación[20].

Aunque existen relatos anteriores de intervenciones radicales[22], será el cirujano Jean Louis Petit (1674-1750)[15], quien asiente que la enfermedad se inicia en los ganglios axilares, por ello, abogaba por la mastectomía total, así como la resección de las glándulas axilares[23,24].

Se introducía la esperanza asociada a la cirugía para curar la enfermedad. De hecho, el desarrollo y conocimiento de la anatomía topográfica permitió el abordaje quirúrgico de los problemas de salud y a partir de entonces, este enfoque médico comenzó a generalizarse entre los recursos para afrontar el cancro de mama[16,21,23].

Exposición del caso clínico
El abordaje terapéutico

Para la composición de su manuscrito, el cirujano Bartolomé Budi, entrelaza las generalidades de la época con su experiencia clínica en el tratamiento del caso clínico.

Identifica que se trata de un cancro oculto, "para evidenciar más el caso, es hallarse en este tumor cancroso oculto o no ulcerado, una dureza obstinada, rebelde a toda resolución, situada ordinariamente debajo del pezón. Con el tacto algún dolor, desigualdad en el tumor y el color tira a lívido, las venas de alrededor tupidas y negras, requisitos todos infalibles para capitularle por tal cancro"[8].

De este modo, pasa a evaluar los datos clínicos para alcanzar un juicio clínico, donde "la curación se fundamente en tres fuentes, la primera la dieta, la segunda la farmacéutica, la tercera la quirúrgica, fundamentos necesarios para toda curación quirúrgica"[8].

Además, resalta la importancia del abordaje quirúrgico al tratarse de "una enfermedad en la cual peligra la vida de la paciente, en cuyo supuesto resuelva ser la única curación la extirpación del cancro"[8], y en este caso, al tratarse de un cancro oculto, "el único y seguro remedio es el cuchillo, pues con el no solo se logra extirpación de dicho cancro, también se logra limpiar la parte de las glándulas, saturadas de las sales corrosivas, alimento preciso de dicho tumor cancroso"[8].

Para facilitar la intervención quirúrgica, Budi, pauta una dieta ligera evitando cualquier exceso "y desorden, que impiden una buena defecación de los líquidos para la mejor nutrición requerida (…). Consistiendo en impedir todo aire impuro antes bien temperado y saturado de cuerpos sutiles, a fin de que linfa y demás líquidos adquieran en su ventilación mejor movimiento circular, se eviten los alimentos y ácidos, impregnados de sales terrestres, fijas y corrosivas, las que sirven solo de incrasar más en las glándulas (…) dicho alimento y bebida a de constar de sales volátiles, para la mejor circulación de los líquidos"[8].

Mientras que, para la segunda fuente, "la farmacéutica" debe "moderar la potestad de la cólera y apagar el incendio que suelen padecer en las vísceras las enfermas que adolecen de este afecto"[8].

Un planteamiento propio en las disertaciones médicas coetáneas que aludían a la importancia de la dieta, evitando "todos los alimentos calientes, salados, y vino (…), los alimentos y bebidas deber ser atemperantes, que dulcifiquen y emboten las puntas a dichos áci-dos, para que mudándoles la textura, no tome la úlcera mayor extensión y se remitan los síntomas"[25].

Por último, se sugieren tratamientos hoy inimaginables, que incluían cataplasmas y emplastos de cicuta, jugos de belladona, opio, ungüentos de mercurio y plomo. Así como cáusticos con arsénico o zinc, cuya efectividad se basaba en la producción de necrosis de los tejidos que serían seccionados progresivamente[26,27].

Pero en el manuscrito, el profesor de cirugía no profundiza en ambas áreas de conocimiento, nutrición y farmacología, concluyendo, en un ejemplo de especialización de su disciplina, que ambas fuentes de tratamiento pertenecen "a la dirección del médico a quien directamente tocan y no nos detendremos"[8].

De este modo, pasa a centrarse en la intervención quirúrgica. Primer, describe una fase preoperatoria donde recuerda la importancia de la autorización del paciente y su valoración integral para determinar la viabilidad quirúrgica. Budi, aclara que "nuestra enferma tiene el tumor cancroso en el pecho derecho debajo del pezón, del tamaño de un huevo. Y la de edad de treinta años que ordinariamente las fuerzas son contundentes"[8].

Asimismo, puntualiza que la intervención no es recomendable "cuando el cancro está pegado a las costillas o sus músculos, por su extensa infiltración", y cuando se "extiende no solo a la mamila y a partes vecinas, pero también cuando esta anejo a las glándulas axilares [axilas] no se debe intentar la obra"[8].

Homólogos contemporáneos añaden que "para extirpar con acierto, se requiere cirujano docto, experimentado y diestro en operaciones manuales, para que separe la mamila del musculo pectoral (…), porque muchas veces, cuando parece que está enteramente vencido y la ulcera con perfecta cicatriz, suele relucir en la mamila, porque se hizo la amputación sin estar bien purgado del todo"[25].

Una vez valorados todos estos supuestos, Budi describe la intervención quirúrgica en tres partes, "primero se hará una incisión longitudinal correspondiente a la esencia del tumor, de suerte que el tumor venga a quedar descubierto en medio de la incisión. Lo segundo valerse de la mano izquierda para agarrar el tumor con ella. Lo tercero con el cuchillo que se ha hecho la incisión, que ha de ser derecho largo y agudo, llamado bisturí, termino facultativo. Separar el cancro del pezón y cuidar de no cortarlo, porque la mamila no quede con deformidad, y sacado el tumor cancroso, se deja el bisturí y se tomara unas tijeras a botón para cortar todas las durezas y glándulas que quedasen, de las cuales suele hallarse muchas pegadas al músculo pectoral, si quedare una sola, quedará obra imperfecta y para reconocer bien dichas glándulas, es necesario levantar el brazo a la enferma, y para obviar también de esta manera el peligro que hay de cortar el músculo pectoral"[8].

Finalizada la intervención, detalla que para controlar el sangrado y acelerar la cicatrización se "pondrán sobre los orificios de los vasos que saliere sangre, una

planchuelita mojada en agua de llantén y en lo demás de la herida su parche de trementina (…) para oponerse a la inflación que pueda sobrevenir"[8].

Apoyándose en su experiencia, concluye su manuscrito ensalzando los beneficios del tratamiento quirúrgico, "puedo asegurar que con este método he logrado muchas curaciones de cancros, y con especialidad, cuatro el año pasado (…), los cuales, por la gran misericordia de Dios, están perfectamente"[8].

Pero a pesar de la defensa del abordaje quirúrgico por el autor, el tratamiento se encontraba en vías de consolidación y requería una mayor evidencia científica, un ejemplo de ello es una publicación en la prensa de la época que recogida como "la Academia de Cirugía de París, no dándose por plenamente satisfecho de las disertaciones compuestas sobre el asunto propuesto en el año 1736. Si se debe cortar el cancro del pecho. Ha suspendido el premio, volviendo a proponer la misma cuestión para el año 1738, y así ofrece al que me-jor la desempeñare premio doble"[28].

Conclusiones

El relato lineal de la obra nos permite disponer de la perspectiva del cirujano para afrontar la enfermedad, su pronóstico, el enfoque clínico e intervención quirúrgica de un cancro de mama oculto y, desde una visión más general, la realidad de la práctica médica en la sociedad española durante la primera mitad del siglo XVIII. Vislumbrando un contexto de transformación del saber médico, con un tránsito de un modelo hipocrático, donde el pensamiento humoral predominó en la construcción del conocimiento de las enfermedades durante siglos, a un modelo biologicista que nace bajo la perspectiva de análisis de la enfermedad, donde el individuo se convirtió en objeto de transformación, con la concepción de que el agente causal de la enfermedad era de origen biológico y su modo de acción unicasual.

Del mismo modo, el texto se enmarca en un contexto de profesionalización de la cirugía como disciplina médica que, amparado en los avances en el conocimiento de la anatomía humana, será esencial en los progresos terapéuticos del cáncer de mama. Unos avances que estarán liderados desde las academias médicas y que constituirán foros esenciales para favorecer y buscar la vanguardia del conocimiento científico, que implementaran notables avances en la cirugía en general y en el abordaje quirúrgico del cáncer de mama en particular, como serán los alcanzados en la siguiente centuria con el desafió del dolor, la hemorragia y la infección quirúrgica, con el desarrollo de la anestesia y los principios de la antisepsia[29].

Unos recursos terapéuticos que se ampliarán con la incorporación de la quimioterapia y la radioterapia, ambos complementarios a la acción quirúrgica, siendo éstas más innovadoras con el advenimiento de la cirugía reconstructiva y preservadora de mama.

Avances a los que se suman la concienciación social hacia las medidas de prevención y detección precoz. Que en su conjunto, muestran una evolución de la enfermedad de un escenario limitado como se refleja en la presente obra del cirujano Bartolomé Budi, con procedimientos agresivos, mutilantes y altas tasas de fracaso. A una visión multidisciplinar actual, con registros elevados de supervivencia gracias a la instrucción de la secuenciación, oncología de precisión, inmunoterapia, terapia celular e investigación clínica que han permitido la comprensión de los mecanismos de regulación inmunitaria del microentorno tumoral[30].

Conflicto de intereses
Los autores declaran no tener ningún conflicto de intereses.

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CASE REPORT

Cuando la piel revela el diagnóstico: el rol decisivo del dermatólogo en una paciente con insuficiencia respiratoria grave

When the skin reveals the diagnosis: the decisive role of the dermatologist in a patient with severe respiratory failure

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Resumen

Una mujer de 40 años con antecedentes de hipotiroidismo autoinmune, tratada con levotiroxina, presentó una historia de un mes de tos irritativa, disnea progresiva, fiebre baja vespertina y artralgias. Su estado empeoró, requiriendo traslado a la UCI para intubación orotraqueal. El diagnóstico por imagen inicial reveló infiltrados pulmonares bilaterales, atelectasia adhesiva y adenopatías, con pruebas microbiológicas y serológicas negativas. La dermatología desempeñó un papel crucial al identificar lesiones cutáneas sugestivas de dermatomiositis, confirmadas mediante biopsia. Este diagnóstico condujo al inicio del tratamiento adecuado, que incluía corticosteroides, ciclofosfamida, tacrolimus, plasmaféresis y tofacitinib, lo que dio lugar a una mejora respiratoria gradual y a la extubación final.

Palabras clave: Insuficiencia respiratoria, hipotiroidismo autoimmune, dermatomiositis.

Abstract

A 40-year-old woman with a history of autoimmune hypothyroidism, treated with levothyroxine, presented with a month-long history of irritative cough, progressive dyspnea, evening low-grade fever, and arthralgias. Her condition worsened, requiring transfer to the ICU for orotracheal intubation. Initial imaging revealed bilateral lung infiltrates, adhesive atelectasis, and adenopathy, with negative microbiological and serological tests. Dermatology played a crucial role in identifying skin lesions suggestive of dermatomyositis, confirmed by biopsy. This diagnosis led to the initiation of appropriate treatment, including corticosteroids, cyclophosphamide, tacrolimus, plasmapheresis and tofacitinib, resulting in gradual respiratory improvement and eventual extubation.

Key words: Respiratory failure, autoimmune hypothyroidism, dermatomyositis.

Descripción del caso:

Se presenta el caso de una mujer de 40 años sin hábitos tóxicos ni factores de riesgo cardiovascular conocidos que tenía como único antecedente relevante un hipotiroidismo autoinmune, para el cual realizaba tratamiento con levotiroxina.

En enero de 2024, la paciente ingresó en el Hospital de Manacor debido a un cuadro clínico que incluía un mes de tos irritativa, disnea progresiva hasta mínimos esfuerzos, febrícula vespertina y artralgias. Su situación clínica se deterioró, lo que llevó a su traslado a la Unidad de Cuidados Intensivos (UCI) del Hospital Son Llàtzer, donde fue necesaria la intubación orotraqueal debido al empeoramiento de la insuficiencia respiratoria.

Las pruebas radiológicas iniciales revelaron infiltrados parcheados con tendencia a confluir en ambas bases pulmonares. Se observó un infiltrado intersticial periférico con sospecha de atelectasias adhesivas y posibles micronodulaciones en las zonas donde coexisten los infiltrados, así como adenopatías en el hilio derecho y en los hilios inferiores bilaterales, sin evidencia de derrame pleural (**Figura 1**). Los hemocultivos, PCR para virus respiratorios, y las pruebas de antígeno en orina para Legionella y neumococo fueron negativos, al igual que el test de Quantiferon y las serologías virales.

Figura 1: TAC tórax con contraste: infiltrados pulmonares en ambas bases.

En el estudio inicial de autoinmunidad, se detectaron anticuerpos antinucleares (ANA) con un título de 1/320. Dado el cuadro clínico, se realizó una interconsulta al servicio de dermatología por sospecha de sarcoidosis.

Durante la exploración física, se observó hipertrofia de las cutículas de los dedos de ambas manos, eritema periungueal, megacapilares en el pliegue ungueal proximal y eritema en nudillos (**Figuras 2, 3 y 4**). Se realizó una biopsia en sacabocados de una de las lesiones del dorso de las manos, en la que se observó hiperqueratosis variable, acantosis y degeneración

vacuolar de la capa basal. En la dermis, se identificó ectasia vascular y un infiltrado inflamatorio perivascular, hallazgos compatibles con lesiones cutáneas sugestivas de dermatomiositis.

Figura 2: Imagen clínica: hipertrofia de cutículas y eritema periungueal.

Figura 3: Dermatoscopia: hipertrofia de cutículas y presencia de megacapilares.
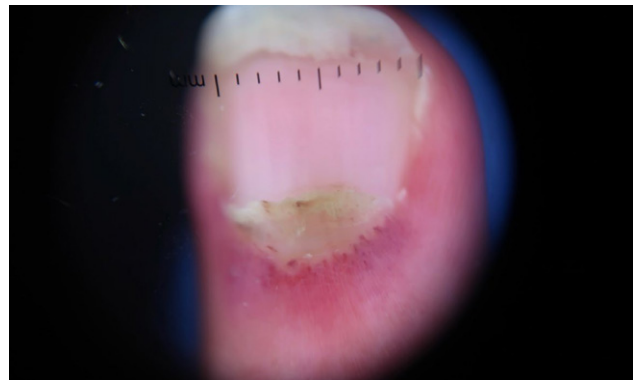

Figura 4: Imagen clínica: pápulas de Gottron.

Posteriormente, se revisó la analítica y se confirmó que los niveles de creatina quinasa (CK) eran normales. Se amplió el estudio con la determinación de anticuerpos específicos para miositis, resultando positivo el anticuerpo anti-MDA5. No se identificó ninguna neoplasia oculta en las pruebas de imagen realizadas.

Con todos estos datos, se diagnosticó a la paciente de dermatomiositis amiopática con neumopatía intersticial rápidamente progresiva. El tratamiento incluyó la administración de corticoides, ciclofosfamida, tacrólimus y recambios plasmáticos. Ante la falta de respuesta adecuada, se añadió tofacitinib al régimen terapéutico. Con este tratamiento, la paciente presentó una mejoría progresiva a nivel respiratorio, lo que permitió su extubación tres meses después.

Discusión

El caso presentado subraya la importancia del dermatólogo en el diagnóstico y tratamiento de la dermatomiositis (DM) con afectación pulmonar intersticial (API). Las manifestaciones cutáneas específicas, como las pápulas de Gottron, son indicativas y pueden preceder o acompañar al resto de sintomatología asociada a la enfermedad, ayudando a su identificación temprana.

La DM con API es una forma grave y potencialmente mortal de la enfermedad, especialmente en pacientes positivos para anti-MDA5. Esta condición a menudo es resistente a tratamientos convencionales como glucocorticoides y otros inmunosupresores. En este contexto, los inhibidores de JAK, como el tofacitinib, han surgido como una opción terapéutica prometedora. El tofacitinib ha demostrado mejorar la supervivencia y la función pulmonar en pacientes con DM y API que no responden a tratamientos convencionales.

Este fármaco actúa reduciendo la inflamación y la fibrosis al inhibir las vías JAK/STAT, lo que resulta en una disminución significativa de los biomarcadores asociados con la actividad de la enfermedad. La incorporación de tofacitinib en el manejo de la DM con API puede ofrecer una alternativa efectiva y mejorar el pronóstico en casos graves.

En conclusión, el papel del dermatólogo es crucial para la identificación temprana y el tratamiento adecuado de la DM, y el uso de tofacitinib representa un avance importante en el tratamiento de formas graves de esta enfermedad. La combinación de un diagnóstico oportuno y una terapia innovadora puede mejorar significativamente los resultados y la calidad de vida de estos pacientes.

Juicio clínico final
Dermatomiositis amiopática anti-MDA5 con neumopatía intersticial rápidamente progresiva secundaria.

Conflicto de intereses
El autor declara no tener ningún conflicto de intereses.

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