ORIGINAL

Awareness and Practice of Caregivers toward Type 1 Diabetes Among Children in Khartoum State 2021

Conciencia y práctica de los cuidadores hacia la diabetes tipo 1 entre los niños del estado de Jartum 2021

Yousif Mohammed Alhaj[1], Alzahra Busatui Alzain[2], Ghanem Mohammed Mahjaf[3], Mosab Nouraldein Mohammed Hamad[4] (ID)

1. Associate professor, Faculty of Medicine , Karary University, Sudan
2. Sudan Medical Specialization Board, pediatrics and Child Health Council
3. Department of Medical Microbiology, Faculty of Medical Laboratory Sciences, Shendi University, Sudan
4. Lecturer of Parasitology and Medical Entomology, College of Health Sciences, Elsheikh Abdallah Elbadri University, Sudan

Corresponding author
Mosab Nouraldein Mohammed Hamad
E-mail: musab.noor13@gmail.com

Abstract

Background: Type 1 diabetes, also known as juvenile diabetes or insulin-dependent diabetes, is a chronic autoimmune disease in which the pancreas produces very little or no insulin due to autoantibodies against the β-cell of the pancreas. Insulin is a hormone that is required for sugar (glucose) to enter cells and produce energy. Knowledge of disease and socioeconomic status (SES) of family, mother, and caregiver plays an important role in the management of diabetes, especially type 1 diabetes in children.
Objective: To assess the Awareness and Practice of caregivers toward Insulin dependent diabetic children in Khartoum State 2021.
Methodology: It was a descriptive, cross-sectional hospital-based study conducted at Sudan's childhood diabetes center. Data were collected through interviewer-administered data collection sheets on the children's caregivers (Google form).
Results: A total of 93 caregivers of type 1 diabetic children participated in this study; according to the demographic data of the children; their age range from 4 to 14 years, 51 (55%) children were aged from 5-10 years, and 33 (36%) were aged more than 10 years, and 9 (10%) were aged less than 5 years with an average age of 9 years. According to the maternal educational level; most of the mothers 57 (61%) graduated from university. Of most of the fathers 36 (39%) were employees, and 30 (32%) were free workers. According to the awareness and attitude, type 1 diabetes; all (100%) of them were aware of to use of insulin (ideal dose, site of injection, storage of insulin, injection with supervisor or alone), 81 (87%) of the caregivers were aware to types of diabetes, 81 (87%) of them were aware to Hb A1C, 78 (84%) of them were aware to home blood glucose monitoring (HBGM), and FBG, 78 (84%) of the participants were aware to types of diet (number of meal/day, types of meals/day, sugar content or not, exercise or not on exercise), and 78 (84%) of the participants were aware symptoms of hypoglycemia and hyperglycemia. However, some of the participants had poor awareness regarding diabetes retinopathy and nephropathy.
Conclusion: According to our findings, caregivers with more diabetes awareness and education were able to keep their children's glycemic control better regardless of socioeconomic status. In addition, in the routine questions asked of the diabetic patient and the care provider, a method of assessing socioeconomic changes such as loss of income, divorce, and disability must be incorporated. The majority of the participants in the study had a positive outlook on type 1 diabetes.

Key words: Type 1 diabetes mellitus, Awareness, Practice of Caregivers, Children, Khartoum, Sudan.

Resumen

Antecedentes: La diabetes de tipo 1, también conocida como diabetes juvenil o diabetes insulinodependiente, es una enfermedad crónica autoinmune en la que el páncreas produce muy poca o ninguna insulina debido a los autoanticuerpos contra la célula β del páncreas. La insulina es una hormona necesaria para que el azúcar (glucosa) entre en las células y produzca energía. El conocimiento de la enfermedad y el estatus socioeconómico (SES) de la familia, la madre y el cuidador juegan un papel importante en el manejo de la diabetes, especialmente de la diabetes tipo 1 en los niños.
Objetivo: Evaluar el conocimiento y la práctica de los cuidadores hacia los niños diabéticos dependientes de la insulina en el Estado de Jartum 2021.
Metodología: Se trata de un estudio hospitalario descriptivo y transversal realizado en el centro de diabetes infantil de Sudán. Los datos se recogieron mediante hojas de recogida de datos administradas por un entrevistador a los cuidadores de los niños (formulario de Google).
Resultados: Un total de 93 cuidadores de niños diabéticos tipo 1 participaron en este estudio; según los datos demográficos de los niños; su edad oscila entre los 4 y los 14 años, 51 (55%) niños tenían entre 5 y 10 años, y 33 (36%) tenían más de 10 años, y 9 (10%) tenían menos de 5 años con una edad media de 9 años. Según el nivel educativo materno, la mayoría de las madres, 57 (61%), tenían estudios universitarios. De la mayoría de los padres 36 (39%) eran empleados y 30 (32%) eran trabajadores libres. Según el conocimiento y la actitud, la diabetes tipo 1 todos (100%) conocían el uso de la insulina (dosis ideal, lugar de inyección, almacenamiento de la insulina, inyección con supervisor o sola), 81 (87%) de los cuidadores conocían los tipos de diabetes, 81 (87%) conocían la Hb A1C, 78 (84%) conocían la monitorización de la glucosa en sangre en casa (HBGM) 78 (84%) de los participantes conocían los tipos de dieta (número de comidas al día, tipos de comidas al día, contenido de azúcar o no, ejercicio o no ejercicio), y 78 (84%) de los participantes conocían los síntomas de la hipoglucemia y la hiperglucemia. Sin embargo, algunos de los participantes tenían poco conocimiento sobre la retinopatía y la nefropatía diabéticas.
Conclusión: Según nuestros hallazgos, los cuidadores con mayor conocimiento y educación sobre la diabetes fueron capaces de mantener mejor el control glucémico de sus hijos, independientemente del nivel socioeconómico. Además, en las preguntas rutinarias que se hacen al paciente diabético y al cuidador, debe incorporarse un método para evaluar los cambios socioeconómicos, como la pérdida de ingresos, el divorcio y la discapacidad. La mayoría de los participantes en el estudio tenían una visión positiva de la diabetes tipo 1.

Palabras clave: Diabetes mellitus tipo 1, Conciencia, Práctica de los cuidadores, Niños, Jartum, Sudán

Introduction

Type 1 diabetes (T1D) is a multifactorial disease in which both genetic predisposition and environmental factors promote the triggering of autoimmune responses against pancreatic beta cells, which ultimately result in beta cell destruction and severe impairment of insulin secretion[1]. The incidence of type 1 diabetes is increasing at a rate of 3% to 5% per year based on studies reviewed from the United States, Germany, Poland, and Italy[2]. Type 1 diabetes mellitus (T1DM) results from the destruction of pancreatic β-cells that is mediated by the immune system. Multiple genetic and environmental factors found in variable combinations in individual patients are involved in the development of T1DM. Genetic risk is defined by the presence of particular allele combinations, which is the major susceptibility locus (the HLA region) that affects T cell recognition and tolerance to foreign and autologous molecules. Multiple other loci also regulate and affect features of specific immune responses and modify the vulnerability of β-cells to inflammatory mediators[3].

A variety of presenting symptoms has been described, the most common being the classical triad of polyuria, polydipsia, and weight loss. In addition, the frequency of presentation in the life-threatening condition of diabetic ketoacidosis (DKA) reported in the literature is variable from 10 to 80%[4].

The effects of glycemic extremes on the developing human brain's structure and function are of increasing interest to both diabetes and clinical neuroscience communities[5]. Severe hypoglycemia is a significant and relatively common complication of insulin treatment in children with type 1 diabetes[6]. The long-term cognitive effects of such episodes have been debated. One hypothesis is that severe hypoglycemia occurring early in development is more harmful to cognitive function than severe hypoglycemia later in development, but few data address this issue directly. If this hypothesis was correct, it could explain the consistent finding that early onset of type 1 diabetes predicts poorer cognitive function[7,8].

Treatment of individuals with type 1 diabetes in the acute care setting often differs greatly from the care required by type 2 diabetics. Clinicians should be aware that type 1 diabetics may have difficulty with fasting requirements and may need more intensive glucose monitoring and modifications to existing insulin therapy. Patients with type 1 diabetes are considered at high risk for hypoglycemia during periods of fasting and diabetic ketoacidosis if their basal insulin is not administered. Nurses and all members of the care team should be aware that basal insulin should not be held without specific indications[9].

The ADA applies the general diabetes nutrition principles to patients with type 1 or types 2 diabetes. The current recommendation includes a focus on healthy food patterns rather than strict diets. Nutrient-dense foods and high quality are recommended, such as whole grains, fruits, vegetables, low-fat dairy, and lean proteins. Highly processed foods with added sugar are discouraged. The ADA also recommends an individualized medical nutrition therapy program provided by a registered dietician[10]. These interventions have been shown to decrease hemoglobin A1c values by nearly 1% in type 1 diabetics, particularly when carbohydrate counting is a primary focus[11]. Patients who ask about nutritional supplements should be advised that without evidence of underlying deficiency, no benefit has been seen from additional herbal or non-herbal supplementation, such as cinnamon[12].

Materials and methods

Study design
It was a descriptive, cross-sectional hospital-based study.

Study area
This study conducted at the Sudanese childhood diabetes center is an independent charitable voluntary non-profit based in coordination between volunteers and families of children with diabetes are directly intended Boamah that those who work in the organization of Aatkadon salaries and allowances of any Aatkadon any party.

Study duration
This study was conducted during the period from May 2021 to January 2022.

Study population
All caregivers with an adiabatic child were in the study area during the study period.

Data collection tools and methods
Data were collected through interviewer-administered data collection sheets on the children's caregivers (Google form). A specially designed questionnaire was prepared for this purpose and filled by the principal investigator and trained registrars of pediatrics specialty in Sudanese childhood diabetes detailed information will be collected from the hospital records.

Study variables
Dependent variables, Knowledge of the mother about her child's illness and emergencies. Independents Variables, demographic age, residence, occupation, and education level.

Data analysis and interpretations
Dara analyzed Statistical Package for Social Sciences SPSS. The data will be calculated as numbers, and % frequencies. The Chi-square test was used for categorical variables and to find an association among them. Statistically, the mean value is accepted as P<0.05, which was considered a significant difference.

Ethical considerations:

Ethical approval will be obtained from SMSB counsel of the Council of Pediatrics and Child Health. Ethical approval will be obtained from SMSB ethical research committee and EDC. Ethical approval will be obtained from the Ministry of Health Ethical approval will be obtained from the selected hospital. A verbal informed consent and personal data confidentiality will be provided to participants by using serial codes instead of names.

Results

It was a cross-sectional hospital-based study conducted in Khartoum state the estimated sample size was 113; 10 patients were excluded due to other co-morbidities. A total of 93 caregivers of insulin-dependent diabetic children participated in this study; according to the demographic data of the children; their age ranges from 4 to 14 years, 51 (55%) children were aged from 5-10 years, 33 (36%) were aged more than 10 years, and 9 (10%) were aged less than 5 years with an average age of 9 years. Most of them 69 (74%) were females, and 24 (26%) were males.

Despite the residence, the majority of the population 39 (42%) live in Khartoum north (Bahri), and 36 (39%) live in Khartoum, followed by 12 (13%) living in Omdurman. According to the maternal educational level; most of the mothers 57 (61%) graduated from university, 18 (19%) studied secondary school, and 15 (16%) were postgraduates. Most of the studied population 78 (84%) had a moderate income, 9 (10%) had a low income, and 6 (7%) had a high income. Most of the fathers 36 (39%) were employees, 30 (32%) were free workers, and 9 (9.7%) were doctors, while most of the mothers 48 (52%) were housewives, 15 (16%) were employees, and 6 (7%) were doctors (**Table I**).

Moreover, almost half 48 (52%) of the studied population had a positive family history of DM, among them, 30 (63%) had a history from the father's side, 9 (19%) had a history from the mother's side, and 9 (19%) had a history from both sides. The majority of the population 69 (74%) had type 1 DM, while 24 (26%) had type 2 DM. According to the awareness and attitude insulin-dependent diabetes; all of them were aware of to use of insulin, 81 (87%) of the caregivers were aware of types of diabetes, 81 (87%) of them were aware of Hb A1C, 78 (84%) of them were aware to RBG, and FBG, and 72 (77%) of them aware to hypoglycemia, hyperglycemia, and dietary needs of diabetic patients. furthermore, they have poor awareness of diabetic retinopathy, diabetic nephropathy, and diabetic ketoacidosis (**Table II**). There was no significant association between income and awareness of insulin-dependent diabetes *P-value*>0.05 Some variables were significantly associated with *P-value*<0.05 (**Table III**). There was a significant association between the educational/cognitive performance and awareness of insulin-dependent diabetes *P-value*<0.05 while there was no significant association between RBG & FBG and awareness of insulin-dependent diabetes *P-value*>0.05 (**Table IV**).

Table I: The distribution of caregivers of type 1 diabetic children according to their occupation (N=93).

Fathers' occupation	Frequency	Mothers' occupation	Frequency
Doctor	9 (10%)	Doctor	6 (7%)
Employee	36 (39%)	Employee	15 (16%)
Engineer	6 (7%)	Housewife	48 (52%)
Free worker	30 (32.3%)	Teacher	9 (10%)
Other	12 (13%)	Other	15 (16%)
Total	93 (100%)	Total	93 (100%)

Table II: The awareness and attitude of caregivers regarding type 1 diabetes (N=93).

Awareness and attitude variables	Frequency	
	Yes	No
Types of diabetes	81 (87%)	12 (13%)
Use of insulin	93 (100%)	0 (0%)
Dietary needs of diabetic patients	72 (77%)	21(22.6%)
Hypoglycemia	72 (77%)	21 (23%)
Hyperglycemia	72 (77%)	21 (23%)
Diabetic retinopathy	45 (48%)	48 (51%)
Diabetic nephropathy	48 (52%)	45 (48%)
Diabetic ketoacidosis	63 (68%)	30 (32%)
Hb A1C	81 (87%)	12 (13%)
RBG	78 (84%)	15 (16%)
FBG	78 (84%)	15 (16%)

Table III: The association between the income and awareness toward type 1 diabetes. (N=93).

Awareness and attitude variables		Income				P-value
		High	Low	Moderate	Total	
Types of diabetes	No	0	3	9	12	0.11
	Yes	6	6	69	81	
Use of insulin	No	0	0	0	0	-
	Yes	6	9	78	93	
Dietary needs of diabetic patients	No	0	6	15	21	0.01
	Yes	6	3	63	72	
Hypoglycemia	No	1	4	15	21	0.01
	Yes	6	3	63	72	
Hyperglycemia	No	0	5	16	21	0.01
	Yes	6	3	63	72	
Diabetic retinopathy	No	3	6	39	48	0.64
	Yes	3	3	39	45	
Diabetic nephropathy	No	3	6	36	45	0.51
	Yes	3	3	42	48	
Diabetic ketoacidosis	No	0	6	24	30	0.02
	Yes	6	3	54	63	
Hb A1C	No	0	0	12	12	81
	Yes	6	9	66	81	
RBG	No	3	0	12	15	0.03
	Yes	3	9	66	78	
FBG	No	2	1	12	15	0.03
	Yes	3	9	66	78	

Table IV: The association between the educational/cognitive performance and awareness toward type 1 diabetes.

Awareness and attitude variables		Educational/cognitive performance				Total	P-value
		Excellent	Good	Moderate	Weak		
Types of diabetes	No	3	3	6	0	12	0.001
	Yes	27	45	6	3	81	
Dietary needs of diabetic patients	No	3	9	6	3	21	0.001
	Yes	27	39	6	0	72	
Hypoglycemia & Hyperglycemia	No	3	6	9	3	21	0.001
	Yes	27	42	3	0	72	
Diabetic retinopathy	No	12	21	12	3	48	0.001
	Yes	18	27	0	0	45	
Diabetic nephropathy	No	9	21	12	3	45	0.001
	Yes	21	27	0	0	48	
Diabetic nephropathy	No	9	21	12	3	45	0.001
	Yes	21	27	0	0	48	
Diabetic ketoacidosis	No	6	12	9	3	30	0.001
	Yes	24	36	3	0	63	
Hb A1C	No	3	6	3	0	12	0.81
	Yes	27	42	9	3	81	
RBG & FBG	No	3	9	3	0	15	0.50
	Yes	27	39	9	3	78	

Discussion

The current study included 93 caregivers of insulin-dependent diabetic children ranging in age from 4 to 14 years, with the most common age group being 5-10 years, with 51 (54.8 percent) children with an average age of 9 years. Females outnumbered males. Iversen et al. conducted another study on children with type 1 diabetes aged 1 to 7 years[13]. Their research sheds light on what it's like for mothers and fathers to have a child with T1D. We'll discuss the following key findings: Sub-themes: A life-changing situation, always on guard, and struggling to let go considering existential dimensions involved; lived body, lived time, lived space, and lived relations to others[14]. This is consistent with the study's phenomenological foundation. According to Saad et al., the peak incidence age was between 11 and 15 years (15.9/100,000). The incidence rates in children under the age of five and between the ages of 16 and 19 were 8.4 and 7.7/100,000, respectively. There was no statistically significant difference between men and women[15]. The study reported a different peak age than the current study. According to the current study's maternal educational level, 57 (61 percent) of the mothers had completed university. The majority of those in the study, 78 (84 percent), earned a middle-class income. The majority of fathers (38.7 percent) worked, while the majority of mothers (48.6 percent) stayed at home with their children. A Sudanese study reported that 32.3% of caregivers were primary/ intermediate level of education, while 34.3% were post graduated. Regarding the study of Alboushi et al, there was an improvement in the awareness of caregivers which was noticed by a change in knowledge, attitudes, and practice toward improving the control of diabetes among their children[16]. Higher-educated caregivers perform better on knowledge tests,

which leads to improved glycemic control[15,17]. Based on this information, interventions such as knowledge assessments and appropriate education may help to reduce any knowledge disparities based on income, which, while not significant in our study, may help to improve glycemic control in all children. With a P-value of 0.01 in this study, there was a significant relationship between socioeconomic income and knowledge of diabetic patients' dietary needs. According to the findings, caregivers' awareness is strongly related to their socioeconomic status. However, due to a lack of data on the relative contribution of diabetes complications in many African countries, estimates of diabetes costs may be understated[18]. In this study hypoglycemia and hyperglycemia are two diverse types of blood sugar levels. Hb A1C level P-value=0.04 and P-value=0.01. Alboushi et al, informed that health education had a significant effect, on regularly done HbA1C before intervention the percentage was 51.6%, but after the post-intervention 75.3%[19]. Al-Odayani et al. reported in a similar study that the socio-demographic data of mothers was recorded through self-report. It was discovered that there was a significant difference in diabetes knowledge among mothers of various ages (p>0.05). Mothers in their eighties and widowed mothers were more informed, but the difference was not statistically significant (p>0.05). There were no significant findings between family income and diabetes knowledge (p>0.05). Higher-income and knowledge, on the other hand, were found to have a positive relationship. There was a significant relationship between the mother's diabetes knowledge and HbA1C level (r=-0.1739, p0.05), indicating that greater knowledge leads to better HbA1c control [48]. Both studies agreed that having a good socioeconomic

and educational level will have a positive impact on mothers' awareness of diseases. These findings are in line with previous studies and support the effectiveness of diabetes education in assisting mothers who are caring for a child with diabetes to achieve better glycemic control. Only 2.4% of the children had HbA1c levels that were in the optimal glycemic control range, 31.32 percent were in the suboptimal glycemic control range, and 66.26 percent were in the poor glycemic control range, according to this pediatrics clinic[18-20].

Conclusion

Regardless of socioeconomic status, caregivers with more diabetes awareness and education were able to maintain better glycemic control of their children, according to our findings. In addition, a method of assessing socioeconomic changes such as loss of income, divorce, and disability must be incorporated into the routine questions asked of the diabetic patient and the care provider. The majority of the people in the study had a positive attitude toward type 1 diabetes mellitus (T1DM).

Recommendations

The current levels of diabetes knowledge in Sudanese mothers were only marginally better, indicating the need for additional educational assessments and supplemental diabetes education as needed such as social network support and first aid training centers. Further studies on a large scale are needed to obtain more generalized and accurate findings. Increase awareness regarding diet control by providing nutritional centers and nutritionists among the diabetic pediatric population and their caregivers. More diabetic care centers, and pediatric endocrinologists, should be provided for all social and economic differences. And health insurance should be available as a basic health care service for the population and should be taken seriously. Finally, this study backs up previous findings linking age, knowledge, and education levels to HbA1c profiles, revealing who is most at risk for poor glycemic control.

Sources of Funding

Conflict of Interest

The author has declared that no competing interests exist.

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