

# Comparison of pain intensity and disability in patients with and without metabolic syndrome undergoing spinal stenosis surgery

*Comparación de la intensidad del dolor y la discapacidad en pacientes con y sin síndrome metabólico sometidos a cirugía de estenosis espinal*

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## Abstract

**Objective:** Lumbar spinal stenosis (LSS) refers to the narrowing of the canal to the extent that it causes pressure on the spinal cord or nerve roots. Considering the physical, mental and economic complications of LSS, the objective of the present study was to compare the treatment outcomes in patients with and without MetS.

**Methods:** The study population included LSS patients referred to Imam Khomeini Hospital in Ilam city for spinal stenosis surgery. The patients were assigned into case group (n=42) with MetS and control group (n=42) without MetS. Data collection instruments including demographic profile form, Quebec back pain disability scale (QBPDS) and Oswestry Disability Index (ODI). After dividing the patients into case and control groups, surgical procedures were performed on the patients and the pain and disability status of both groups were compared two months after surgery. Data analysis was carried out using SPSS software.

**Result:** Result showed, 88 patients with LSS were included in the study, of whom 44 were male and 44 were female. Also, the mean (SD) age of the patients was 48.23 (5.34) years and educational level of most of the patients was below high school diploma. The mean (SD) pain score of control and case groups was 49.88 (20.37) 63.14 (22.07), respectively, which shows a statistically significant difference (P=0.005) (Table II). Moreover, mean (SD) disability score of control and case groups was 44.21(22.78) and 55.29 (21.23), respectively, which shows a statistically significant difference (P=0.017).

**Conclusion:** Our study, like the review of the literature, shows a higher prevalence of pain and disability in LSS patients with MetS than in patients without MetS. For this reason, it is necessary to take necessary measures to control MetS in order to reduce the pain and disability in these patients.

**Keywords:** pain, disability, spinal stenosis surgery.

## Resumen

**Objetivo:** La estenosis espinal lumbar (EEL) se refiere al estrechamiento del canal hasta el punto de causar presión sobre la médula espinal o las raíces nerviosas. Teniendo en cuenta las complicaciones físicas, mentales y económicas de la EEL, el objetivo del presente estudio fue comparar los resultados del tratamiento en pacientes con y sin MetS.

**Métodos:** La población del estudio incluyó pacientes con EEL remitidos al Hospital Imam Jomeini de la ciudad de Ilam para cirugía de estenosis espinal. Los pacientes fueron asignados a un grupo de casos (n=42) con SM y a un grupo de control (n=42) sin SM. Los instrumentos de recogida de datos incluían el formulario de perfil demográfico, la escala de discapacidad por dolor de espalda de Quebec (QBPDS) y el índice de discapacidad de Oswestry (ODI). Tras dividir a los pacientes en grupo de casos y grupo de control, se realizaron procedimientos quirúrgicos en los pacientes y se comparó el dolor y el estado de discapacidad de ambos grupos dos meses después de la cirugía. Los datos se analizaron con el programa SPSS.

**Resultados:** Se incluyeron en el estudio 88 pacientes con EEL, de los cuales 44 eran varones y 44 mujeres. Asimismo, la edad media (DE) de los pacientes era de 48,23 (5,34) años y el nivel educativo de la mayoría de los pacientes era inferior al bachillerato. La puntuación media (DE) de dolor de los grupos de control y de casos fue de 49,88 (20,37) 63,14 (22,07), respectivamente, lo que muestra una diferencia estadísticamente significativa (P=0,005) (Tabla II). Además, la puntuación media (DE) de discapacidad de los grupos de control y de casos fue de 44,21 (22,78) y 55,29 (21,23), respectivamente, lo que muestra una diferencia estadísticamente significativa (P=0,017).

**Conclusiones:** Nuestro estudio, al igual que la revisión de la literatura, muestra una mayor prevalencia de dolor y discapacidad en los pacientes con LSS con SM que en los pacientes sin SM. Por este motivo, es necesario tomar las medidas necesarias para controlar el SM con el fin de reducir el dolor y la discapacidad en estos pacientes.

**Palabras clave:** dolor, discapacidad, cirugía de la estenosis espinal.

## Introduction

Lumbar spinal stenosis (LSS) refers to the narrowing of the canal to the extent that it causes pressure on the spinal cord or nerve roots. This narrowing occurs in different places, including the central canal of the spinal cord, intervertebral holes, or lateral recesses<sup>1,2</sup>. LSS can lead to pressure on the nerve roots in the lower back and cause symptoms such as significant neurologic deficits, back pain, or disability. Considering that a MRI or CT Scan on large scale is both expensive and time-consuming, the LSS prevalence has been investigated in epidemiological studies with a small sample size. On the other hand, the LSS prevalence has been different in various studies, which is probably due to the lack of standard diagnostic methods and criteria, which has in turn made it difficult to interpret and compare the results of relevant studies<sup>3,4</sup>.

Patients with LSS experience various clinical symptoms such as numbness, fatigue, pain in the buttocks and legs. The most common reason for referral in these patients is pain in the lower limbs and pelvis, which begins after walking and activity and decreases by sitting and leaning forward<sup>5-7</sup>. There are various diagnostic criteria for LSS. Leg or buttock pain while walking, motor or sensory disorders while walking, lower extremity muscle weakness, bending forward to relieve symptoms and back pain are among the clinical manifestations of this disease<sup>8,9</sup>. On the other hand, MRI is used to evaluate the radiological symptoms of this disease and demonstrates information such as the extent of degenerative changes in the lumbar spine and spinal canal, which thus can help physicians achieve a correct and better diagnosis<sup>10,11</sup>.

The treatment includes weight loss, rest, physiotherapy and other supportive care. The primary treatment is non-surgical treatment, but if non-surgical treatments fail to improve the symptoms, surgical treatments such as spinal stenosis surgery plus fusion or spinal stenosis surgery alone are recommended<sup>12,13</sup>. Surgical treatments can impose costs on the patient, the health system and cause complications. On the other hand, the LSS prevalence is high in the elderly, and they are among the high-risk patients due to being at risk for performing surgeries and taking anesthetics. For this reason, preventive procedures or supportive treatments to reduce the disease symptoms are a priority<sup>14,15</sup>. On the other hand, it is sometimes possible that a person has a comorbidity. For example, metabolic syndrome (MetS) has a significant global prevalence and can affect different people and lead to many complications<sup>16,17</sup>.

## Aim

Considering the high prevalence of stenosis in patients with metabolic syndrome and few data in the literature

on the results of surgery and complications of LSS, the objective of the present study was to compare the treatment outcomes in patients with and without MetS.

## Methods

The study population included LSS patients referred to Imam Khomeini Hospital in Ilam city for spinal stenosis surgery. The patients were assigned into case group (n=42) with MetS and control group (n=42) without MetS.

Data collection instruments including demographic profile form, Quebec back pain disability scale (QBPDS)<sup>18</sup> and Oswestry Disability Index (ODI)<sup>19</sup>. QBPDS is a 25-item instrument that is scored based on a five-point Likert scale ranging from 0 and 4. Scores 0-25, 26-50, 51-75, and 76 or higher indicate low, moderate, severe, and very severe and acute pain, respectively<sup>18</sup>. Also, ODI consists of 10 sections and 60 questions that measures level of function in activities of daily living. The disability level is rated using scores 0 (functioning without feeling pain) and 5 (inability to perform activities due to severe pain). Finally, the possible score range is 0-100 and scores 0-20, 21-40, 41-60, 61-80 and high scores demonstrate low, moderate, high, severe disability, and acute disability, respectively<sup>19</sup>.

At baseline, the research objective was explained to the patients, and sampling began after obtaining the related permission from the University Research Ethics Committee. Patients were assigned into two groups, case (with MetS) and control (without MetS). MetS was diagnosed by an internal medicine specialist based on the laboratory documentation, clinical and diagnostic examinations. After dividing the patients into case and control groups, surgical procedures were performed on the patients and the pain and disability status of both groups were compared two months after surgery.

In order to comply with ethics in the research, the objectives of the study were explained to all patients and informed written consent was obtained from all of them. Participation in this study was completely voluntary and patients participating in the study had the right to withdraw from the study at any time during the study. Data analysis was carried out using SPSS 16 software.

## Result

According to the results, 88 patients with LSS were included in the study, of whom 44 were male and 44 were female. Also, the mean (SD) age of the patients was 48.23 (5.34) years and educational level of most of the patients was below high school diploma (**Table I**).

The mean (SD) pain score of control and case groups was 49.88 (20.37) 63.14 (22.07), respectively, which shows a statistically significant difference ( $P=0.005$ ) (Table II). Moreover, mean (SD) disability score of control and case groups was 44.21(22.78) and 55.29 (21.23), respectively, which shows a statistically significant difference ( $P=0.017$ ) (Table III).

## Discussion

The prevalence of MetS in Iran and the world is high. For example, in the meta-analysis study by Maleki et al. on 60,635 patients in the age group of 3-90 years old, it was shown that the prevalence of MetS was 36% and its prevalence was reported to be higher in women than in men<sup>20</sup>. The present study was conducted with the aim of comparing the pain and disability of patients with and without MetS undergoing with spinal stenosis surgery.

According to the results, only a small number of patients reported low pain and most of them reported high pain. Different degrees of pain from mild to severe have been reported in patients suffering from various spinal problems. Patients with lumbar spinal stenosis (LSS) were enrolled into the study by Park et al. They reported that 24 (64.3%) of the patients had

radicular pain<sup>21</sup>. Also, it was reported in the review study by Manzetti et al., that 3% to 90% of 2678 patients with spinal arthrodesis had pain<sup>22</sup>.

Studies also showed that other patients with spinal cord injuries (SCIs) had pain. In this regard, Bresnahan et al. reported that 86% of SCI patients had neuropathic pain and 81% of these them had chronic pain<sup>23</sup>. Similarly, in a study of SCI patients, Rosner et al. reported that 11.3% of these patients had neuropathic pain<sup>24</sup>. In a meta-analysis study, Hunt et al. found that 68% of SCI patients had pain. In fact, chronic pain is one of the symptoms of SCIs, which can affect all physical and mental aspects of these patients and cause crises in their lives. These patients may experience one or several types of pain<sup>25</sup>. Various factors affect the pain experience of these patients, including the area of involvement and the type of SCI problems do that the prevalence of pain in LSS patients is reported to be significant<sup>26,27</sup>.

According to the results of the present study, the prevalence of postoperative disability was reported to be high. Barker et al. reported disability in most of the SCI patients<sup>28</sup> and Silfverskiold et al. also reported disability in 84% of patients<sup>29</sup>. In a review study, Halicka et al. also demonstrated pain and disability in patients following spinal surgery<sup>30</sup>, which is consistent with the results of the present study regarding the presence of disability in LSS patients. Regarding the level of disability in MetS patients, it was also shown that this group of patients suffer from high disability. In the study of MetS patients by Carriere et al., it was shown that the most of these patients had disability, which in turned led to impaired physical mobility<sup>31</sup>, which is consistent with the results of the present study.

According to the results of previous studies, the prevalence of pain and disability in LSS patients who had MetS was higher than in patients without MetS. It has been shown in various studies that MetS reduces the quality of life and related variables. In this regard, it was shown in Rahimpour et al.'s study that MetS can lead to a decrease in the quality of life<sup>32</sup>, which is consistent with the results of the present study. Due to the fact that the study was conducted in a limited population and one city (Ilam city), its results cannot be generalized to the whole country or the whole world.

In D'Agostino et al.'s study, which was conducted with the aim of relating MetS and Spinal epidural lipomatosis (SEL), it was shown that if SEL is detected in radiological examinations of the patient, such as MRI or CT scan, it can be used in the early diagnosis of MetS<sup>33</sup>. Also, in cohort study by Ono et al showed Having SEL can be effective in developing MetS. In fact, SEL is a risk factor for MetS and viceversa<sup>34</sup>.

## Conclusions

Our study, like the review of the literature, shows a higher prevalence of pain and disability in LSS patients with MetS than in patients without MetS. For this reason, it is necessary to take necessary measures to control MetS in order to reduce the pain and disability in these patients.

## Conflict of interests

The authors declare that there is no conflict of interests.

**Table I:** Comparison of demographic variables in patients with and without MetS undergoing surgery with spinal canal stenosis.

Variable		Case	Control	P
Gender	Man	24 (54.5)	21 (47.7)	0.14
	Female	20 (45.5)	23 (52.3)	
Marital status	Single	10 (22.7)	12 (27.2)	0.41
	Have a wife	34 (77.3)	32 (72.8)	
Education	High school	18 (41)	17 (38.6)	0.13
	Diploma	17 (38.6)	16 (36.4)	
	Master's degree	9 (20.4)	11 (25)	
	and Bachelor's degree			
Age	20-29	2 (4.5)	0 (0)	0.22
	30-39	9 (20.5)	16 (36.4)	
	40-59	19 (43.2)	16 (36.4)	
	>65	14 (31.8)	12 (27.2)	
Residence status	City	10 (22.7)	12 (27.3)	0.41
	Village	34 (77.3)	32 (72.7)	

**Table II:** Comparison of pain intensity in patients with and without MetS undergoing surgery with spinal canal stenosis.

Variable	Low	Medium	High	Very High	M(SD)
Case	5 (11.9)	14 (33.3)	14 (33.3)	9 (21.4)	49.88 (20.37)
Control	3 (7.1)	10 (23.8)	13 (31)	16 (38.1)	63.14 (22.07)
P	0.005				
F	0.77				

**Table III:** Comparison of disability status in patients with and without MetS undergoing surgery with spinal canal stenosis.

Variable	Low	Medium	High	Very High	Very very intense	M(SD)
Case	6 (14.3)	9 (21.4)	13 (31)	12 (28.6)	2 (4.8)	44.21 (22.78)
Control	1 (2.4)	12 (28.6)	14 (33.3)	11 (26.2)	4 (9.5)	55.29 (21.23)
P	0.017					
F	0.20					

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