# Frequency of Diabetes Mellitus in Patients with Lumbar Spinal Canal Stenosis

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## Abstract

**Objective:** Diabetes mellitus (DM) is a systemic disease affecting different tissues. Hyperglycemia due to DM can lead to degenerative changes in spinal tissue. Also low data have examined the prevalence of diabetes mellitus in lumbar spinal canal stenosis individuals. Therefore the purpose of this study was determining the frequency of DM in lumbar spinal canal stenosis patients.

**Materials and Methods:** A cross-sectional study on 119 lumbar spinal canal stenosis patients, since September 2014 till February 2015 from the department of neurosurgery in Rahnamoon hospital of Yazd, Iran was done. After gathering of demographic data, these subjects divided in two groups based on present or absent of DM. The latest criteria established by the American Diabetes Association (ADA) were used to diagnose DM patients.

**Results:** The frequency of DM among lumbar spinal canal stenosis patients was 22.7 %. The frequency of DM was higher in women than men that there was significant difference in the diabetic and non-diabetic patients ($P$=0.002). Also the mean age of diabetic patients was higher than non-diabetic patients ($P$=0.036). Diabetes was more prevalent in patients older than 50 years old.

**Conclusion:** According to our findings, the frequency of DM among lumbar spinal canal stenosis patients was high that may be a probably predisposing factor for the development of significant lumbar disc disease in this region. Also other factors may help to develop lumbar spinal stenosis.

**Keywords**: Lumbar spinal canal stenosis, Diabetes mellitus, Prevalence.

## Introduction

The incidence of diabetes mellitus (DM) is high in the Middle East countries. The prevalence of DM was 14.52% in Yazd, that is the highest prevalence of diabetes in Iran (1,2). Also DM is the fourth non-infectious chronic disease in elderly individuals in the United State (3). So, the early diagnosis of diabetes can lead to reduction of diabetic complications.

DM is a multi-organs disorder that affects different tissues such as connective tissue. Skeletal disorders are more common in diabetic patients (4). Lumbar spinal canal stenosis (LSCS) cause disability and low



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quality of life. LSCS is one of the most common spinal disorders in the elderly (5,6). Previous studies showed approximately 60% of LSCS patients suffer from low back pain (7).

Prevalence of DM in persons candidate for lumbar disc surgery is more than compared with other surgery (8). Some reports indicated a high prevalence of degenerative disorders in diabetic patients (9,10). Also the inverse association between lumbar spine trabecular bone score and insulin resistance may make it an indicator for determining skeletal deterioration in diabetic patients (11). The incidence of degenerative lumbar spine diseases and DM are increasing, particularly in elderly subjects (12,13). The aim of this cross-sectional study was determining the frequency of DM in patients with LSCS.

## Materials and Methods

This descriptive cross-sectional study was designed on patients suffering from LSCS (n=119) who were registered between September 2014 and February 2015 in the Department of neurosurgery in Rahnamoon hospital of Yazd, Iran. Patients provided signed informed consent prior to participation. General medical history, physical examination, lumbar spine X-ray and computed tomography (CT) scan of all subjects were recorded. Definition of LSCS patients were subjects who have clinical symptoms of neurogenic claudication for more than 3 months, with patent posterior tibialis and dorsalis pedis arteries on physical examination, and evidence of central canal stenosis (<9 mm diameter) in CT scan and/or MRI (6). These subjects divided in two groups based on present or absent of DM. The latest criteria established by the American Diabetes Association (ADA) were used to diagnose of DM patients, fasting blood sugar (FBS)≥126 mg/dl and random blood sugar (BS)≥200 mg/dl with clinical symptoms or previously diagnosed type 2 diabetes. The frequency of DM was determined among the LSCS patients. Data collected from each patient by a questionnaire that included demographic data such as age, gender, location (living area).

### Statistical Analysis

Data analyzed using SPSS software version 18 (SPSS Inc., Chicago, IL). Chi -squared tests for descriptive data and Fisher's exact test and student T-test was employed for frequency of DM and relationship between DM with demographic data. *P*-values≤0.05 were considered as statistically significant.

## Results

Totally, 119 patients were registered in this study. The demographic and clinical characteristic of subjects is shown in Table 1. The frequency of DM among LSCS patients was 22.7 % (27 patients).

Relationship between frequency of DM with demographic and baseline characteristics are shown in Table 2. DM frequency was 27 (22.7%) among LSCS patients. The frequency of DM was higher in women (32.8%) than men (8.1%), that there was significant difference in female to male ratio in the diabetic and non-diabetic LSCS patients (*P*=0.002, Fisher's exact test). The mean age of diabetic patients was 61.1±8.9 years old compared to 54±16.6 years old for non-diabetic patients (*P*=0.036, T-test). The frequency of DM was higher in patients older than 50 years old.

## Discussion

Diabetes mellitus causes several changes in all of the body systems. Delay diagnosis or

**Table 1. Patients' characteristics**

| Characteristics | N(%)/Mean(±S.D.) |
|---|---|
| **Mean age** | 55.6±15.5 |
| **Gender** | |
| **Male** | 49 (41.2%) |
| **Female** | 70 (58.8%) |
| **Living area (residence)** | |
| **Yazd** | 70 (58.8%) |
| **Non-Yazd** | 49 (41.2%) |
| **Diabetes Mellitus** | |
| **Yes** | 27 (22.7 %) |
| **No** | 92 (77.3%) |

**N: Number**



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**Table 2. Association of demographic data with frequency of diabetes mellitus in LSCS patients**

| Demographic & baseline characteristics | Diabetic patients (27) N (%) | Non-Diabetic patients (92) N (%) | Total N (%) | *P*-value |
|---|---|---|---|---|
| **Gender** | | | | |
| **Male** | 4 (8.1%) | 45 (91.8%) | 49 (41.2%) | 0.002 |
| **Female** | 23 (32.8%) | 47 (67.1%) | 70 (58.8%) | |
| **Mean age (±S.D.), years** | 61.1±8.9 | 54±16.6 | 55±13.6 | 0.036 |
| **Living area (Residence)** | | | | |
| **Yazd** | 19 (27.1%) | 51 (72.8%) | 70 (58.8%) | 0.18 |
| **Non-Yazd** | 8 (16.3 %) | 41 (83.7%) | 49 (41.2%) | |

untreated diabetic patients are at risk of complications, which causes significant public health load and cost. Identification of risk factors for DM is the major step in development of prevention strategies in any country. We evaluated the frequency of DM among LSCS patients in this study in Yazd, Iran.

Prevalence of DM in Yazd was 14.52% in Afkhami-Ardekani study (2) and 10.6% in other study in 2009 year in the same region (1). Also this rate was 8.2% (14), 16.1% (15), 17.6% (16) and 15.5% (17) in other regions of world. The DM frequency was 22.7% in LSCS patients in our study whereas it was reported different in the other countries, Israel 28% (10) and 13.6% (18). Also the Nick Sakellaridis Study showed incidence of 32% diabetes in patients operated for lumbar disc problems compared with 13% in groups of patients operated for other reasons (8). Many predisposing factors for lumbar disc disease have been found. DM as a well-known disease causing microangiopathy, is suggested that can develop clinically significant lumbar disc disease and it is a predisposing factor (19-21). However, the mechanism by which DM may predispose a patient to spinal canal stenosis is unclear. But the intervertebral discs plays a key role in the pathophysiology of spinal canal stenosis and since the changes found in the cartilaginous matrix in diabetic patients may differ from the normal aging process may cause high frequency of this problem in this population (22). Therefore according to high DM prevalence in these patients, our population is at risk.

Other factors such as age , family history and obesity may contribute as predisposing factors for lumbar disc disease (23). DM causes multi-organ involvement, including intervertebral discs and joints, resulting in early degeneration (24,25). For support of our observation, in other study, only 14.1% of patients with spinal canal stenosis were younger than 50 years old (10). Explanation for this observation is that our population is relatively old (mean age of 55 years) compared to these studies. However, a previous study reported patients with spinal canal stenosis had a higher incidence of DM in all age groups (18). Association between genders with incidence of DM in our research was significant (higher in female) that might be explained by high frequency of female in this study population.

## Conclusion

In conclusion, DM as a risk factor may be a probably predisposing factor in development of significant lumbar disc disease in this region. Also age and female along with DM may be important factors for initiation or progression of spinal canal stenosis.

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