# The Prevalence of Low Back Pain in Patients with Type 2 Diabetes Mellitus in Oman

## Mazin S. Al-Rudaini[1]*, Sanam Anwar[2], Yousuf Al Farsi[3], Asma Alhosni[4] and Salem Al Ghaithi[5]

[1]Department of Medicine, College of Medicine and Health Sciences, National University, Suhar, Oman.
[2]Department of Public Health and Epidemiology, College of Medicine and Health Sciences, National University, Suhar, Oman.
[3]Department of Family Medicine, Head of Non-communicable Diseases, North Al Batinah, Oman.
[4]Department of Neurosurgery, Khoulah Hospital, Muscat, Oman.
[5]Department of Medicine, Suhar Hospital, Suhar, Oman.
*Corresponding Author E-mail: mazinsaleh@nu.edu.om

Musculoskeletal diseases are frequently seen in patients with type 2 diabetes mellitus. The link between low back pain and type 2 diabetes mellitus remains unclear. This study aimed to find the prevalence of low back pain among Omani patients with type 2 diabetes mellitus and to determine patients' disability related to low back pain. Methods: Two hundred patients with type 2 diabetes mellitus were included in this cross sectional study, who attended the diabetic clinic in Suhar polyclinic and Suhar hospital, North Batinah, Oman. Data collection tool was a pretested structured questionnaire, as well as the medical records collection for all the participants. The patients' related disability to low back pain was assessed using the Oswestry Low Back Pain Disability Questionnaire. Results: Of the 200 patients with type 2 diabetes mellitus, 60% (120) reported low back pain. From those who had low back pain, around half (50.8%) had a minimal disability and more than one third (37.6%) had a moderate disability related to low back pain. The low back pain was mostly present in females (65.9%), those with a family history of low back pain (87.6%) and those using insulin to control diabetes (100%), ($P < 0.05$). Conclusion: The prevalence of low back pain is high among Omani patients with type 2 diabetes mellitus, and significantly high among females, those with a family history of low back pain and those using insulin to control diabetes. A significant percentage of patients had minimal to moderate disabilities related to low back pain which necessitate an implantation of the preventative and educational measures to minimize the burden of the low back pain among diabetic patients.

**Keywords:** Disability; Low back pain; Oman; Patients; Prevalence; Type 2 diabetes mellitus.

Lower back pain is a distinctive measure for the discomfort felt between the 12th rib superiorly and the gluteal fold inferiorly which may or may not radiate to the lower limbs.[1] Fifty five percent of the general population recorded that they experience low back pain as it is considered the most common presentation to the clinic and might deteriorate to a disability.[2] Lower back pain results from irritation of pain sensitive structure like the intervertebral disk, facet joint and the ligament.[3]

Diabetes mellitus is associated with many spinal diseases like intervertebral disc herniation, spinal stenosis and spinal surgical complications. Increased blood sugar and raised glycosylated hemoglobin (HbA1c) are parts of the metabolic disturbance associated with type 2 diabetes mellitus which increases the likelihood of low back pain. Its effects are neuropathy, reduction in muscle strength and flexibility as well as increased adipose deposition. Recently published articles have interlinked the metabolic disturbance of diabetes mellitus and intervertebral disk degeneration by cellular death due to a chronic inflammation which eventually leads to loss of the matrix. Other authors approved that diabetes mellitus raises the incidence of disk prolapse and subsequently narrowing the spinal canal.[2,4,5]

Most of the published papers have studied the association between the articulation of lower and upper limbs and diabetes mellitus, but there are few studies on prevalence of low back pain among patients with type 2 diabetes mellitus.[6] The recorded data showed the number of patients suffering from low back pain is two times higher than those without diabetes mellitus and it also approved that chance of admission is higher due to complication and further disability. In brief, conducting a study on the relationship between type 2 diabetes mellitus and low back pain will reduce the incidence of complications and need for admissions as it will illicit the problem as early as possible.[7]

The aims of this study were to investigate the prevalence of low back pain in patients with type 2 diabetes mellitus and demonstrate any possible related factors; in addition, such patients may get the chance to seek medical approach to prevent future disability.

## MATERIAL AND METHODS

A cross sectional study on the prevalence of low back pain in type 2 diabetic patients was conducted in North Batinah Wilayat, Oman. The patients attending diabetic clinic in Suhar polyclinic and Suhar hospital during a period of 12 months from August 2019 onwards formed the target population of this study. Inclusion criteria were known as type 2 diabetic patients who came for follow up of all ages and both genders, with any type of antidiabetic medications. Exclusion criteria were history of accident, back trauma or surgery, malignancy, type 1 diabetes and gestational diabetes, hematological diseases (e.g.: sickle cell anemia, thalassemia, etc.), infectious bone diseases and patients with severe comorbid diseases like renal diseases (stage 3 and above), heart failure and liver diseases. Informed consent was received from 200 patients who met the inclusion criteria and thus they were recruited in the study.

The data collection tool was a pretested structured questionnaire. The questionnaire included questions on the demographic data, features of low back pain like duration, onset, location, radiation, and associated symptoms. There were also questions on medical comorbidities and any medical or surgical treatment sought for pain. Additional data were collected from Al Shifa health system (medical records) in both the centers which included complete blood count, lipid profile, renal function test, bone profile, and the last reading of glycosylated hemoglobin (HbA1c). The height in meter and weight in kilogram was measured using the Detecto scale in the hospital and thus body mass index (BMI) was computed for all the patients. A complete back examination was done and findings were recorded. Low back pain disability was assessed using the Oswestry Low Back Pain Disability Questionnaire. The Oswestry Disability Index is a tool that is used to measure a patients' low back pain permanent functional disability.[8]

### Statistical analysis

The data were entered, coded, and analyzed using the SPSS version 22.0. Descriptive statistics were used to assess the demographic data in the form of proportions, mean and standard deviation. The prevalence of low back pain and its attributes were collected as frequency and percentages. The Chi square test was applied to derive p-values in order to identify the significance of the results. A p-value less than 0.05 was used for statistical significance.

### Ethical clearance

The study was approved by the Institutional Research Review Board (IRRB) and the Research and Ethical Review and Approve Committee-North Batinah Governorate (RERAC NBG) Oman, (Ref. No. MH/DHGS/NBG/1923139908/2019). Patient's consent was taken from all the patients included in this study.

## RESULTS

**Study sample characteristics**

The study was conducted on 200 participants who were type 2 diabetes patients from Suhar polyclinic and Suhar hospital. The mean age of patients was 55.4 ±10.45 years. Out of them, 31% were more than 50 years of age. Most of them were females 135 participants (67.5%) and only 65 participants (32.5%) were males. Most of the participants (94.5%) were outpatient and only 5.5% were inpatient. Comorbidities were reported in 116 participants (58%). When asked about smoking status, only 3% were smokers currently, 5% were ex-smokers while most of them (92%) were non-smokers. The family history of back pain was present in 72 participants (36%). It was found that most of the participants (60.5%) did moderate physical activity, 15.5% reported vigorous physical activity while only 24% were either sedentary or practiced mild physical activity.

Body mass index ascertained obesity was present in most of them (84.5%); mean BMI was 30.2±5.6. Dyslipidemia was found in 65% of the participants which was either raised low density lipoprotein (LDL) or cholesterol levels or both. Mean duration of diabetes was 9.2±6.6 years. Most of the participants were on oral diabetes medication (65.5%) and few were on insulin (11.5%); however, 23% were on both insulin and oral medications. Nonetheless, uncontrolled diabetes ascertained by HbA1c levels was found in 70.5% of the study participants (Table 1).

**Prevalence and features of low back pain**

History of low back pain was present in 120 participants; thus, prevalence of low back pain was found to be 60% in the present study. The mean duration of back pain was 33.08 months. Most of them (70%) reported a gradual onset of pain and only 30% reported a sudden onset. The most common site of pain was lower spine (88.3%) while only 11.7% reported a pain in the

**Table 1.** Characteristics of the study sample

| Variable | | Frequency (No.=200) | Percentage (%) |
|---|---|---|---|
| Gender | Male | 65 | 32.5 |
| | Female | 135 | 67.5 |
| Age (years) | ≤50 | 138 | 69 |
| | >50 | 62 | 31 |
| Source of information | Inpatient | 11 | 5.5 |
| | Outpatient | 189 | 94.5 |
| Comorbidities | Yes | 116 | 58 |
| | No | 84 | 42 |
| Smoking | Yes | 6 | 3 |
| | No | 184 | 92 |
| | Ex-smoker | 10 | 5 |
| Family history of low back pain | Yes | 72 | 36 |
| | No | 128 | 64 |
| Dyslipidemia | Yes | 130 | 65 |
| | No | 70 | 35 |
| Obesity | Yes | 169 | 84.5 |
| | No | 31 | 15.5 |
| Physical activity | Mild & Sedentary | 48 | 24 |
| | Moderate | 121 | 60.5 |
| | Vigorous | 31 | 15.5 |
| Diabetes medication | Insulin | 23 | 11.5 |
| | Oral | 131 | 65.5 |
| | Both | 46 | 23 |
| Uncontrolled diabetes | Yes | 141 | 70.5 |
| | No | 59 | 29.5 |

whole back. Intermittent pain was present in 48.3% while 51.7% reported a continuous back pain. Back pain was associated with numbness in the lower limbs (22.5%), restricted movement (20%), both numbness and restricted movement in 27.5% people. Most of the patients informed doctor about their back pain (82.5%).

On examination of these 120 participants, the posture was found normal in most of them (88.3%) and only 11.7% of them had abnormal posture. A normal gait was seen in 90.8% and only 9.2% had abnormal gait. The curvature of the spine was normal in most of them (70.8%); only 29.2% had abnormal curvature. There was no tenderness on the back in most of them (81.7%),

only 18.3% had tenderness. Range of movements was restricted only in 46.7% while most (53.3%) had a normal range of movements. Straight leg test was positive only in 4.2%, the rest (95.8%) had negative test finding. Imaging was normal in only 1.7%; abnormalities were seen in 29.2% while 69.2% had not undergone imaging.

On investigations, it was found that the mean cholesterol levels of patients with low back pain was 4.82±10.3mmol/l; mean LDL was 2.75±0.83 mmol/l and mean high density lipoprotein (HDL) was 1.19±0.38 mmol/l. Abnormal cholesterol and LDL levels were present in 35.8% and 18.3% patients of low back pain respectively. Abnormal glomerular filtration rate (stage 1 and 2 chronic kidney diseases) was found in 20% of low back pain patients. Both mean calcium and phosphate levels (2.32 and 1.28 mmol/l respectively) were in the normal range.

The Oswestry Low Back Pain Scoring Disability findings showed that most of the patients with low back pain (50.8%) had a minimal disability in the score range 0 to 20%. Moderate disability with 21 to 40% score was present in 37.6% of them; severe disability score of 41 to 60%

**Table 2.** Prevalence of Oswestry Low back pain Disability (n=120).

| Disability score | Percentage (%) |
|---|---|
| 0-20 (minimal disability) | 50.8 |
| 21-40 (moderate disability) | 37.6 |
| 41-60 (sever disability) | 8.3 |
| 61-80 (crippled) | 3.3 |
| 81-100 (bed ridden) | 0 |

**Table 3.** Attributes of low back pain in Oman

| Variable | | Low back pain present(n=120) | | Low back pain absent(n=80) | | *p value |
|---|---|---|---|---|---|---|
| | | Frequency | Percentage | Frequency | Percentage | |
| Gender | Male | 31 | 47.7 | 34 | 52.3 | 0.014 |
| | Female | 89 | 65.9 | 46 | 34.1 | |
| Age (years) | ≤50 | 78 | 56.5 | 60 | 43.5 | 0.134 |
| | >50 | 42 | 67.7 | 20 | 32.3 | |
| Family history of | Yes | 63 | 87.5 | 9 | 12.5 | 0.000 |
| low back pain | No | 57 | 44.5 | 71 | 55.5 | |
| Dyslipidemia | Yes | 72 | 55.4 | 58 | 44.6 | 0.069 |
| | No | 48 | 68.6 | 22 | 31.4 | |
| Obesity | Yes | 103 | 60.9 | 66 | 39.1 | 0.523 |
| | No | 17 | 54.8 | 14 | 45.2 | |
| Physical activity | Mild & Sedentary | 33 | 68.8 | 15 | 31.2 | 0.320 |
| | Moderate | 68 | 56.2 | 53 | 43.8 | |
| | Vigorous | 19 | 61.3 | 12 | 38.7 | |
| Diabetes medication | Insulin | 23 | 100 | 0 | 0 | 0.000 |
| | Oral | 70 | 53.4 | 61 | 46.6 | |
| | Both | 27 | 58.7 | 19 | 41.3 | |
| Uncontrolled diabetes | Yes | 86 | 61 | 55 | 39 | 0.658 |
| | No | 34 | 57.6 | 25 | 4 2 . 4 | |

* P-value less than < 0.05 considered be statistically significant

was found in 8.3% and only 3.3% were crippled with a score of 61 to 80%. None of them were bedridden with a score of 81 to 100% (Table 2).

**Attributes of low back pain**

Low back pain was present mostly in females (65.9%) compared to males (47.7%) and this difference was statistically significant (p<0.05). With increasing age, low back pain increased; 67.7% with age more than 50 years had back pain compared to 56.5% with age less than 50 years but this difference was not found to be statistically significant. Family history of low back pain was found to be a very important risk factor. It was found that 87.5% with family history had back pain compared to 44.5% who did not report family history; this difference was found to be highly statistically significant (p<0.01).

Dyslipidemia was associated with low back pain only in 55.4% of the patients with back pain while most of them did not show dyslipidemia (68.6%) and this association was not found significant. Even though obesity was associated with most of the low back pain patients (60.9%) compared to 54.8% who did not have obesity, but this finding was not found to be significant (p>0.05). Similarly even though most of the low back pain patients had moderate (56.2%) or vigorous (61.3%) physical activity, the relation was not significant statistically.

All the patients who used insulin for treatment of diabetes had back pain (100%) compared to 53.4% who used oral medications and 58.7% who used both; thus making prolonged diabetes calling for the use of insulin as an important risk factor for low back pain. This association was highly statistically significant (p<0.01). However, uncontrolled diabetes was found in 61% of the low back pain patients compared to 57.6% who did not have uncontrolled diabetes as measured by HbA1c levels, but this difference was also not significant (Table 3).

## DISCUSSION

Low back pain and other musculoskeletal diseases are frequently seen among patients with type 2 diabetes mellitus, in spite of this fact, the correlation between the two pathologies is not well established.[9]

The prevalence of low back pain in type 2 diabetes mellitus patients in this study was found to be 60%, such high prevalence was also found in Eivazi et al[4] (63.4%), although lower prevalence rates were reported by Idowu et al[10] and Jimenez-Garcia et al[11] (31.5% and 37.1%, respectively). Such wide variation in the prevalence rate of low back pain may reflect selection bias or variety of populations.[3]

In this study, different variables were correlated with other cofactors which have a contributory effect on the low back pain. Female gender, family history of low back pain and those on insulin therapy used to control the diabetes mellitus were found to have strong attributes with low back pain. Eivazi et al[4] concluded that females were more prone for low back pain compared with diabetic males which are consistent with outcome we recorded in our study. Similarly, Dario et al[12] study in Spain and Rinaldo et al[13], both revealed that diabetic females were more prone for low back pain. Rinaldo et al[13] reported that individuals on insulin therapy recorded to have low back pain with a potential of a spinal surgery, also the use of insulin in diabetic patients is highly suggestive of poorly controlled status with hyperinsulinemia that makes the patients prone to deposition of proteoglycan chondroitin sulphate in the intervertebral disk that disturbs the normal structure and leads to a degeneration. Regarding the family history of low back pain in first degree relatives with type 2 diabetes mellitus, most literature showed that the low back pain in genetically predisposed individuals will have severe slow recovery chronic back pain in comparison to those without a family history.[14]

In this study, we found that age, dyslipidemia, obesity, physical activity and status of diabetes did not have significant associations (p>0.05). Most of the research had controlled age on their studied sample to avoid cofounding effect, but as known, elderly are more prone for back pain in comparison to younger individuals, also high BMI increases the risk of low back pain by both mechanical and chemical pathways.[15] Uncontrolled diabetes has a great contribution to low back pain due to vasculopathy which decreases the blood supply to the vertebral disc and as a consequence is more prone for prolapse.[16] In this study, status of

diabetic therapy shows that those on insulin have more low back pain than those on other therapy and this can point that those patients were already poorly controlled and switched to insulin to get control. In addition to that, it might point to that, with good control of glycosylated hemoglobin (HbA1c), it would be useful to control the low back pain in such patients.[4]

The assessment of severity of low back pain was approached by the Oswestry Low Back Pain Score. Most of the recorded cases had a minimal disability (50.8%), which doesn't require treatment apart from advice in lifting, sitting and exercise schedule which will provide prophylactic measure to prevent further disability. However, patients with a severe disability (8.3%) need further investigations to formulate a proper management plan. The moderate disability group (37.6%) approached conservatively. None of the countered published research had used the Oswestry Low Back Pain Score.[8]

## CONCLUSION

The prevalence of low back pain is high among Omani patients with type 2 diabetes mellitus, and significantly high among females, those with a family history of low back pain and those using insulin to control diabetes. A high percentage of type 2 diabetes mellitus patients reported to have minimal to moderate disabilities because of the low back pain. The implementation of the preventive and educational measures shall minimize the prevalence and burden of low back pain among diabetic patients.

**Conflict of Interest**

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