Sociodemographic and clinical characteristics of patients with lumbar disc disease in Riyadh, Saudi Arabia: a cross-sectional study

Introduction

Lumbar disc disease (LDD) occurs when the nucleus of a lumbar vertebral disc forces out through the enveloping circular fibrous capsule exposing the adjacent nerve roots to compression. It is one of the most common musculoskeletal diseases affecting about 5% of all individuals. It is characterized by nerve root irritation caused by lumbar disc herniation, either through mechanical or inflammatory processes. In some cases, LDD manifests as radiating pain, known as sciatica, from the back into the dermatome distribution of the irritated nerve root along the femoral or sciatic nerve trunk. Although there are variety of factors that contribute to the development of sciatica, it is most commonly caused by disc herniation. When both lumbar intervertebral disc herniation and sciatica coincide, the condition is referred to as lumbar disc disease or the lumbar disc syndrome.

Even though LDD peaks in the fourth and fifth decades of life, it can occur before the age of 20. The role of height has not been confirmed as a risk for disc herniation about 1.5 to 3 times more than female sex. However, it is not clear whether these differences, although statistically significant, represent a true sex difference in prevalence of disc herniation or difference in sex-related mechanisms contributed to nerve root compression.

Although the role of height has not been confirmed as a risk for disc herniation in all studies, it has been found to predispose both men and women to LDD. The reported relative risk is 3.7 times for tall women (<169 cm) and 2.3 times for tall men (<179 cm) compared with individuals 10 cm shorter. The associations of smoking and obesity with LDD have been found to be inconsistent.

Research conducted over the past 20 years has led to a dramatic move in our understanding of disc degeneration and its etiology. In the past, the main risk factor for disc degeneration was heavy physical loading. However, twin studies and studies of exposure-discordant monozygotic twins have identified suspected risk factors such as routine daily activities and upright posture. Moreover, recent studies have indicated the dominant role of heredity, which explain 74% of variance in adults population studied up to 2004.

Given the significance of problems caused by LDD, studies identifying its causes or risk factors are needed. Male sex has been reported to be associated with sciatica due to disc herniation about 1.5 to 3 times more than female sex. However, it is not clear whether these differences, although statistically significant, represent a true sex difference in prevalence of disc herniation or difference in sex-related mechanisms contributed to nerve root compression.

In a retrospective case-control study investigating the relationship between physical work load and LDD, Ashan et al. have found a...
significant positive association between the exposure to physical
work load and lumbar disc herniation, the relative risks being 3.5
for physical work load, 3.1 for hard work, and 1.3 for working for
more than 8hours. Additionally, in a longitudinal MRI study carried
out by Elferring et al., night shift work, along with the extent of
disc herniation and lack of sports activities have been reported to be
significant independent predictors for development and progression
of lumbar disc degeneration.

The aim of this study was to describe the socio-demographic and
clinical characteristics of patients with LDD attending King Fahad
medical city in Riyadh, KSA.

Methods

Study population and design

This is an observational cross-sectional survey targeting patients
with LDD in the outpatient clinic at King Fahad Medical city. Our aim
was to characterize patients with LDD in terms of socio-demographic
and clinical details. The study was conducted in the period between
September 2015 to May 2016. We included Saudi male and female
patients aged 18 years and above with a formal diagnosis of LDD
confirmed by a specialist. Younger patients and patients with
unconfirmed diagnosis were excluded from the study.

In the absence of accurate data on the prevalence of LDD in
Riyadh, KSA our sample size was calculated based on an estimated
prevalence of 50%, with type I error of 5% and 95% confidence
interval. The calculated sample size was 128 patients.

Data collection

After obtaining a verbal consent and confirming the diagnosis
of LDD by a specialist, we interviewed every participant using a
structured questionnaire. The questionnaire consisted of four main
parts with yes-or-no responses to most questions. The reason of
interview was to eliminate ambiguity of medical terms included in the
questionnaire and to include patients with limited levels of literacy.
The first part of questionnaire contained questions relating to the
participants’ socio-demographic data, such as age, marital status,
and occupation. The second part asked about the history of chronic
diseases, such as diabetes mellitus, hypertension, and osteoporosis.
The third part asked about participants’ behavioral background,
such as exercise practice and smoking. The fourth part asked about
symptoms caused by LDD, including back pain and numbness. At the
end of the interview, the height and weight of all participants were
measured to calculate the body mass index (BMI).

Ethical statement

The investigators asked all participants for their willingness to
take part in the study and the purpose of the study were thoroughly
explained to them at the beginning of the interview. Questions
regarding names and contact details were not included.

Statistical analysis

Descriptive analysis of participants’ socio-demographic and
clinical variables was performed using Statistical Package of Social
Sciences (SPSS) Version 20 (SPSS Inc., Chicago, IL). Categorical
variables such as sex and marital status were presented as frequency
and percentage, and continuous variables such as age and BMI were
presented as mean and standard deviation (SD). Continuous variables
were also computed and recoded into categories. Binary variables
were coded as: 1=yes and 0=no. Comparisons between different
categorical variables were performed using X^2 test. The difference
was considered significant if p<0.05.

Results

Of 128 patients with LDD included in this study, 30 (23.4%) were
males and 98 (76.6%) were females, with the majority (47.7%) of
them older than 45 years. The majority of study subjects were married
(79.7%), and had 3-6 children (35.2%). A significant proportion of
subjects (46.9%) were not employed (Table 1).

Table 1 Sociodemographic characteristic of the sample (N=128)

| Variable         | N | %  |
|------------------|----|----|
| Sex              |    |    |
| Male             | 30 | 23.4|
| Female           | 98 | 76.6|
| Age (years)      |    |    |
| >25              | 15 | 11.7|
| 26-35            | 17 | 13.3|
| 36-45            | 35 | 27.3|
| <45              | 61 | 47.7|
| Marital status   |    |    |
| Single           | 19 | 14.8|
| Married          | 102| 79.7|
| Divorced         | 4  | 3.1 |
| Widow/widower    | 3  | 2.3 |
| Number of children|   |    |
| 1                | 4  | 3.1 |
| 2                | 8  | 6.3 |
| 3-6              | 45 | 35.2|
| 6<               | 28 | 21.9|
| Not applicable   | 43 | 33.6|
| Occupation       |    |    |
| Employed         | 68 | 53.1|
| Not employed     | 60 | 46.9|

As can be seen in Table 1, more than one-third of subjects reported
working duration of 13 hours or more (35.9%), and more than one-
quarter worked 8 to 12 hours (25.8%). Regarding work stress, a
significant proportion of subjects (37.5%) reported suffering from
both physical and psychological stress at work. Sixteen subjects
(12.5%) were current smokers. The remaining lifestyle characteristics
of the sample are presented in Table 2.

Table 3 shows that the vast majority of subjects in our study
are have an abnormal BMI, with 33 subjects (25.8%) having class
I obesity, 16 (12.5%) class II obesity, and 4 (3.1%) morbid obesity.
Forty subjects (31.3%) had hypertension, 36 (28.1%) had diabetes
mellitus, 30 (23.4%) had osteoporosis, and the majority (63.3%)
had vitamin D deficiency. Regarding family history of LDD, more

Citation: Alhowaiti N, Mubarah A, Alrasheed A, et al. Sociodemographic and clinical characteristics of patients with lumber disc disease in Riyadh, Saudi Arabia: a cross-sectional study. MOJ Orthop Rheumatol. 2018;10(4):282-286. DOI: 10.15406/mojor.2018.10.00433
than one-third (36.7) reported having at least one first-degree relative with LDD. The remaining clinical characteristics of the sample are presented in Table 3.

Table 2 Lifestyle characteristic of the sample (N=128)

| Variable                        | N  | %   |
|---------------------------------|----|-----|
| Working hours*                  |    |     |
| 8>30                            | 30 | 23.4|
| 8-12                            | 33 | 25.8|
| ≥13                             | 46 | 35.9|
| Work stress                     |    |     |
| Physically                      | 17 | 21.1|
| Psychologically                 | 15 | 11.7|
| Both                            | 48 | 37.5|
| None                            | 38 | 29.7|
| Exposure to twist at work       |    |     |
| Always                          | 61 | 47.7|
| Sometimes                       | 45 | 35.2|
| Rarely                          | 11 | 8.6 |
| Never                           | 11 | 8.6 |
| Exposure to vibration at work   |    |     |
| Yes                             | 24 | 18.8|
| No                              | 104| 81.3|
| Heavy weight lifting at work    |    |     |
| Yes                             | 60 | 46.9|
| No                              | 68 | 53.1|
| Exercise                        |    |     |
| Once a week                     | 35 | 27.3|
| 3 days/week                     | 23 | 18  |
| Daily                           | 18 | 14.1|
| Never                           | 52 | 40.6|
| Exercise type (n=76)            |    |     |
| Walking                         | 66 | 51.6|
| Weight lifting                  | 3  | 2.3 |
| Running                         | 3  | 2.3 |
| Swimming                        | 2  | 1.6 |
| Other                           | 2  | 1.6 |
| Smoking                         |    |     |
| Yes                             | 16 | 12.5|
| No                              | 112| 87.5|
| Duration of smoking in years*   |    |     |
| 10>                             | 6  | 35.5|
| 11-20                           | 6  | 35.5|
| ≥21                             | 3  | 18.8|

*Total percentages do not add up to 100 because of missing values

Table 3 Clinical characteristic of the sample (N=128)

| Variable                        | N  | %   |
|---------------------------------|----|-----|
| BMI (Kg/m²)                     |    |     |
| Underweight (>18.5)             | 4  | 3.1 |
| Normal (18.5-24.9)              | 35 | 27.3|
| Overweight (25-29.9)            | 36 | 28.1|
| Class I obesity (30-34.9)       | 33 | 25.8|
| Class II obesity (35-39.9)      | 16 | 12.5|
| Class III obesity (≥40)         | 4  | 3.1 |
| Diabetes mellitus               |    |     |
| Yes                             | 36 | 28.1|
| No                              | 92 | 71.9|
| Hypertension                    |    |     |
| Yes                             | 40 | 31.3|
| No                              | 88 | 68.8|
| Hyperparathyroidism             |    |     |
| Yes                             | 5  | 3.9 |
| No                              | 123| 96.1|
| Osteoporosis                    |    |     |
| Yes                             | 30 | 23.4|
| No                              | 98 | 76.6|
| Vitamin D deficiency            |    |     |
| Yes                             | 81 | 63.3|
| No                              | 47 | 36.7|
| Disc herniation                 |    |     |
| Yes                             | 50 | 39.1|
| No                              | 78 | 60.9|
| Family history of LDD           |    |     |
| Yes                             | 47 | 36.7|
| No                              | 81 | 63.3|
| Back trauma                     |    |     |
| Yes                             | 38 | 29.7|
| No                              | 90 | 70.3|
| Back surgery                    |    |     |
| Yes                             | 25 | 19.5|
| No                              | 103| 80.5|

BMI, body mass index; LDD, lumbar disc disease

Table 4 describes the frequency and percentage of the commonly reported symptoms of LDD in the present sample. Sciatica was reported by thirty-seven subjects (28.9%), stiffness was reported by 71 subjects (55.5%), and 74 subjects (57.8%) reported numbness.

Given the significant proportion of obesity in this sample (41.4%), we compared the frequency of LDD symptoms between obese and non-obese individuals. As can be seen in Table 5, obese subjects (i.e.
those with a BMI of $\geq 30$ Kg/m$^2$) significantly suffered from stiffness and numbness as compared to non-obese subjects. The difference was statistically significant for stiffness ($p=0.04$) and numbness ($p=0.001$), but not sciatica ($p=0.36$).

Table 4 Commonly reported symptoms of LDD among the study sample (N=128)

| Variable     | N   | %   |
|--------------|-----|-----|
| Sciatica     |     |     |
| Yes          | 37  | 28.9|
| No           | 91  | 71.1|
| Stiffness    |     |     |
| Yes          | 71  | 55.5|
| No           | 57  | 44.5|
| Numbness     |     |     |
| Yes          | 74  | 57.8|
| No           | 54  | 42.2|

Table 5 The relationship between obesity and symptoms of LDD in the sample (N=128)

| Variable       | Obesity (BMI$\geq 30$ Kg/m$^2$) | $X^2$ | p value |
|----------------|----------------------------------|------|---------|
| Sciatica (n=37)| Yes (n=53)                        |      |         |
|                | 13 (32.0%)                        | 24 (24.5%) | 0.844 | 0.36    |
|                | No (n=24)                         |      |         |
| Stiffness (n=75)|                                  |      |         |
|                | 35 (66.0%)                        | 36 (48.0%) | 4.991 | 0.04    |
| Numbness (n=75)|                                  |      |         |
|                | 40 (75.5%)                        | 34 (45.5%) | 4.991 | 0.001   |

Discussion

The aim of the present study was to describe the sociodemographic and clinical characteristics of Saudi patients with LDD. Several studies have suggested that sociodemographic variables, along with clinical variables play an important role in developing LDD. The occurrence of LDD in this study was higher in females, older and married individuals, those with 3-6 children, and it was slightly more common among employed respondents. Our results are, in fact, consistent with the existing literature suggesting a role of sex in LDD. It is, however, important to put more emphasis on the general perception that LDD is more likely to occur in young men than in young women, most likely due to physical and mechanical stress. The female predominance in this sample may explain, in part, why we found LDD to be more common among females. Another factor is the fact that nearly half (47.7\%) of the respondents in this sample are aged more than 45 years, which is associated with a notably quicker rate of lumbar disc degeneration among females. This also corroborate the previous works suggesting a more prevalence of LDD in the fourth and fifth decades of age.

Regarding marital status, the vast majority (79.7\%) of patients were married and more than one-third (35.2\%) had 3-6 children. Low back pain, either due to LDD or other etiologies, has been found to be associated with marital status, with being married significantly increasing its odds. This could be attributed to the fact that married individuals are exposed to have more physical and psychological stress compared to those who are unmarried.

Back problems are believed to be caused primarily by occupation-related mechanical factors that lead to damage in spinal structures through many mechanisms such as repeated loading. Our findings are consistent with this model given that 53.1\% of patients with in this sample were employed. Furthermore, as clearly described in Table 2, LDD was most likely to be related to work nature and duration, with the majority of patients reported longer working hours and exposure to twist at work. It is also noteworthy that the lower rate of patients exposed to vibration at work can be explained by the female predominance in the current sample, whom we think are less likely than men to have vibration-related works due to social and cultural factors.

Several studies have linked body weight to spinal diseases suggesting a possible role of increased BMI in developing low back pain and intervertebral disc disorder. Our findings confirm this hypothesis given that the majority of patients (69.5\%) had abnormal body mass index, with 41.4\% being obese, Table 3. Obesity could affect degenerative disc diseases through several structural mechanisms such as increased load on joints as a result of postural changes, increased lumbosacral angles, and compressive forces that contribute to lower back pain. Joint misalignment and decreased ambulation and conditioning have also been suggested as mechanical-structural alterations induced by obesity. Moreover, obesity in our study was associated with more symptoms of LDD, significantly with joint stiffness and numbness, Table 5. This may indicate that weight reduction strategies could help in alleviating symptoms of LDD in obese patient. Also, the increased frequency of obese patients could explain the high rates of diabetes mellitus and hypertension in this sample.

Guided by some prior works, we asked the respondents about clinical history of vitamin D deficiency which was found in 63.3\% of patients. It is reported that some cases of chronic back pain could be explained by suboptimal levels of vitamin D in the absence of clear evidence of more common causes. In one study from Saudi Arabia, a low initial dose of vitamin D led to significant clinical improvement in patients with chronic low back pain. The authors of this study concluded that screening for vitamin D deficiency in patients with chronic low back pain should be mandatory.

The role of heredity in LDD is well-established, and it is reported to explain nearly 74\% of variance in adults with LDD. We found that over one-third of patients (36.7\%) had a first-degree relative affected. This also corroborate the previous works suggesting a more prevalence of LDD in the fourth and fifth decades of age.

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The role of heredity in LDD is well-established, and it is reported to explain nearly 74\% of variance in adults with LDD. We found that over one-third of patients (36.7\%) had a first-degree relative affected by LDD.

This study has some limitations such as the small sample size and female predominance. It would be important for future works to use larger and more heterogeneous samples.

Conclusion

The results of this study confirm the importance of sociodemographic and clinical factors in patients with LDD. We emphasize the need for prevention and intervention, particularly regarding preventable factors contributing to LDD such as physical and psychological stress and obesity.

Acknowledgements

None.
Conflict of interest

The author declares no conflict of interest.

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