*Original Article*

# Low back and neck pain intensity and relationship with disability index among dentists

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**Abstract**

**Background:** Non-specific pain of low back and neck has direct impact on quality of life, active days at work, and health care costs. The purpose of this study was to determine the pain intensity and disability index for low back and neck among dentists.

**Materials and Methods:** This cross-sectional study was conducted among 80 dentists (44.6% female and 55.4% male). Dentists pain intensity and low back and neck disability index were evaluated with the self-administered visual analog scale and Oswestry questionnaire, respectively. Statistical data analysis was done using SPSS.

**Results:** Disability index of low back and neck has been reported equal to $26.6 \pm 10.7$ and $22.0 \pm 8.8$, respectively. Also the data showed the average pain intensity of low back and neck to be $75.5 \pm 24$ and $49.6 \pm 19.7$. The result showed significant relationship between pain intensity and disability index for low back and neck with body mass index (BMI) and exercise ($P < 0.05$).

**Conclusions:** According to results, dentists have a high pain prevalence and moderate disability index of low back and neck. Also based on the relationship between the pain and disability index values with BMI and exercise, we recommend practice of relaxation and stretching exercises during breaks in the dentists work schedules to minimize the risk of work-related musculoskeletal disorders among dentists.

## Introduction

Based on previous studies, the most important work-related musculoskeletal disorders among dentists have been reported in the back (80%), neck (58.8%) and shoulder (47%) (1-6). According to several causes of low back pain (LBP), combined movements of bending by tilting the waist increases the risk of lumbar disc disease, on the other hand, the lack of flexibility and weakness of abdominal and gluteal muscles as the stabilizers of the lumbar spine will reinforce this risk (7). Anthropometric features such as height and body weight will increase lumbar lordosis (8), decrease abdominal muscle strength (9) and mobility in the lumbar spine (10). Finally, it will increase the risk of chronic LBP, so that Youdas et al. reported the risk of developing

LBP in women weighing more than 100 kg and in men with a height greater than 180 cm. In addition, they found a significant relation between reduction of the abdominal muscles strength and LBP (11).

One of the most frequent complaints of patients with cervical spine disorders is neck pain and it is a common symptom in the general population (12-14). Neck pain is as common as LBP and it has caused almost the same number of days lost due to absence from work (15). It is estimated that a third of adults will experience neck pain during the one-year period (16) and about 19 percent of the

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population may suffer from chronic neck pain (17). In a study of body posture during work, it was shown that 86 percent of the time, dentists work with at least 30 degree-bent neck and 52 percent of the time, they work with at least 30 degree-bent body (18). The main reason for poor physical condition can be achieving the ideal view of the patient's mouth and providing a comfortable position for the patient (7).

Pain and limited movement of the spine has adverse effects in different styles on functional status, work activities and quality of life, so it is essential that researchers use tools having acceptable validity and reliability to review the inability level and determine the consequences (19, 20). Today, the definition of the World Health Organization (WHO) of the impairment, disability, and handicap is widely accepted (21). According to the studies on patients with back pain, disability index [Oswestry Disability Index (ODI)] is logically limited to WHO definition of disability (22, 23) because it is too difficult to measure disability through questionnaire (24).

Measuring disability is an important component in the management of patients with back and neck pain. Self-report questionnaire of Oswestry is stronger tool compared with , reporting the average value of syptom during last week by other tools, and is confirmed by American Academy of Orthopedic Surgeons (AAOS), and is a very important evaluation tool for researchers, measuring permanent functional inability (25).

In this study, the authors aimed to assess the prevalence and intensity of dentists LBP and neck pain in the first step. In the second step, they aimed to determine low back pain disability index (LBPDI) and neck disability index (NDI) among dentists in order to establish preventative measures for LBP and neck pain.

**Material and Methods**

This cross-sectional study was conducted among dentists of a specialized clinic affiliated with one of the universities of medical sciences in Tehran in 2016. All the employed dentists were enrolled in the study by census (80 dentists). All dentists had consented to participate in this study. The criteria for inclusion in the study were the lack of a history of spinal surgery and traumatic orthopedic problems such as acute neck and back and nerve problems, inflammatory diseases such as ankylosing spondylitis involving the spine, congenital diseases such as scoliosis and hemivertebrae. Due to the mentioned factors, 6 dentists were excluded from the study.

In the first phase, the prevalence and intensity of dentists LBP and neck pain was assessed by body map questionnaire with a visual analogue scale. In second phase, low back pain disability index (LBPDI) and neck disability index (NDI) among dentists was determined using ODI questionnaire (35 dentists with LBP and 43 dentists with neck pain). In the following, used questionnaires and tools are briefly introduced:

**Body Map Questionnaire:** To evaluate the prevalence of musculoskeletal disorders, body map questionnaire was used (26). Validity and reliability of the mentioned questionnaire was determined by Saremi, among Shahed university dentists (27) and it has been used in Nadri et al. study (6). In this questionnaire, to facilitate understanding and position of musculoskeletal disorders, body is divided into 13 areas including low back (LB), neck and etc. in form of a map (26).

**Visual analog scale:** Visual analog scale is made up of a horizontal line with a length of 100 mm and it has two labels including without discomfort and severe discomfort on both sides. To show the level of pain in different parts of body, the subject specifies a point on the line that indicates the level of pain felt by him or her. Then, the severity of discomfort is recorded numerally from zero to 100 using a millimeter ruler. Easy management, sensitivity and ability to respond to statistical analysis can be noted as benefits of visual analog scale (26).

**LLBP and Neck Disability Indices:** A modified version of the ODI questionnaire has a high reliability and validity for the severity of the disability caused by neck pain and LBP (25, 28-31). The questionnaire consists 10 sections; including 7 sections on the activities of daily living, 2 sections for pain and 1 section associated with the focus. The questionnaire or index examines the degree of disability resulted from neck pain and its effect on daily activities of the person. In each section, the degree of disability in performance has been scored from zero (desirable performance and without pain) to five (disability in performance due to severe pain), and the total score is recorded in percentage. So that disability degree is interpreted as mild (0% to 20%), moderate (21% to 40%), severe (41% to 60%), disabling (61% to 80%) and severely disabling (81% to 100%) (25, 28).

Statistical data analysis was done using SPSS (version 22.0, IBM Corporation, Armonk, NY, USA). Kolmogorov-Smirnov test was used to determine the normality of the data. To examine the relationship between demographic characteristics (marital status, gender, and sport) with LBPDI and NDI, the chi-square test was used. to associate the relationship between pain intensity and disability with age, work experience and body mass index (BMI), due to the absence of parametric conditions, the Spearman correlation coefficient was used ($P < 0.05$).

**Results**

About 44.6 percent (33 people) and 55.4 percent (41 people) of the subjects were female and male, respectively. According to the classification of BMI by health communities (33), 4% of the patients in this study were classified as underweight, 41.9% normal, 47.3% as overweight and only 6.8 percent were obese. Therefore, the highest frequency of BMI of people in the study belonged to the overweight class. Table 1 shows the demographic characteristics of the subjects.

**Table 1:** Distribution of dentists' demographic characteristics

| Variables | Mean ± SD | Range |
|---|---|---|
| Age (year) | 38.2 ± 6.6 | 26-53 |
| Experience (year) | 12.7 ± 7.1 | 2-32 |
| Height (cm) | 171.9 ± 8.7 | 155-190 |
| Weight (kg) | 74.5 ± 15.9 | 42-120 |
| BMI (kg m$^{-2}$) | 25.8 ± 4.3 | 16.8-35.1 |

SD: Standard deviation; BMI: Body mass index

There was no significant difference in the relationship between the prevalence of LBP and neck pain with sex, marital status and work habits (left or right handed) ($P > 0.05$). Results of prevalence and classification of LBP and neck pain are shown in table 2. LBP in 40% of patients was classified as severely disabling. In addition, severe neck pain had had the highest percentage (46.5%).

**Table 2:** Percent distribution of low back and neck pain intensity among dentists

| Pain intensity | Prevalence | Mean (SD) | Pain intensity | | | | |
|---|---|---|---|---|---|---|---|
| | | | Mild (0-20) | Moderate (21-40) | Severe (41-60) | Disabling (61-80) | Severe disabling (81-100) |
| Low Back | 47.3 | 75.5 ± 24 | - | 11.4 | 25.7 | 22.9 | 40 |
| Neck | 58.1 | 49.6 ± 19.7 | 4.7 | 27.9 | 46.5 | 9.3 | 11.6 |

SD: Standard deviation

**Table 3:** Percent distribution of disability index of low back and neck among dentists

| Disability index | Mean (SD) | Disability index (%) | | | | |
|---|---|---|---|---|---|---|
| | | Mild (0-20) | Moderate (21-40) | Severe (41-60) | Disabling (61-80) | Severe disabling (81-100) |
| Low back | 26.6 ± 10.7 | 34.3 | 60 | 5.7 | - | - |
| Neck | 22 ± 8.8 | 53.5 | 44.2 | 2.3 | - | - |

SD: Standard deviation

Results of LBPDI and NDI and its classification are shown in table 3. LBPDI of 60% dentists was in the moderate class and NDI of 53.5% dentists was in mild class.

Results of the relationship between disability index and LB and neck pain intensity and the variables of marital status, gender, age, work experience, exercise and BMI are shown in table 4. The disability index of neck pain, disability index of LBP, neck pain intensity and LBP intensity had a significant relationship with BMI and exercise.

**Table 4:** Relationship between intensity pain and disability index of low back and neck with dentists' demographic characteristics

| Variables | Married (P-value) | Gender (P-value) | Age (P-value) | Experience (P-value) | Exercise (P-value) | BMI (P-value) |
|---|---|---|---|---|---|---|
| Low back pain disability index | 0.597 | 0.260 | 0.481 | 0.643 | 0.034 | 0.003 |
| Low back pain intensity | 0.075 | 0.058 | 0.552 | 0.885 | 0.014 | 0.006 |
| Neck disability index | 0.947 | 0.751 | 0.985 | 0.357 | 0.002 | 0.002 |
| Neck pain intensity | 0.238 | 0.430 | 0.857 | 0.750 | 0.064 | 0.003 |

BMI: Body mass index

## Discussion

Oswestry Pain Questionnaire evaluates the effects of pain on performance and how to do everyday activities. In other words, it examines the psychological status of a person's beliefs and attitudes of his inability to perform everyday activities. Although the efficacy of the disability questionnaires to evaluate disability has been reported in many studies (25, 32), the results of this evaluation method can be influenced by the person's attitude towards the effect of pain on his life. However, disability evaluation questionnaires show an important aspect of limitation in performance that this issue represents the significance of using them especially in the first referral to occupational therapists, because the patient provides a general image of his performance for the occupational therapist in addition to his belief about pain and disability (33).

According to the studies measuring the intensity of pain, visual analog scale flaws can be confusing when showing pain intensity on one line, and its correct understanding by the test subjects, so that elderly and illiterate people will have the highest problem here. Given that the target population in this study were all educated, by confidence, it can be stated that such a problem would not be an issue (6, 26).

In the present study, disability of LBP and neck pain mean has been reported as 26.6 ± 10.7 and 22 ± 8.8, respectively. The index of disability resulted from LBP in 60% of people of the study was placed in the classification of average disability index (with the range of 21 to 40). In addition, 53.5% and 44.2% of people had mild and moderate disability index resulted from neck pain, respectively. According to interpretation of moderate disability index, although personal care and sleep in these patients are not affected greatly, they have more pain when sitting, standing and lifting, traveling and social life are difficult for

them, and it might lead to missing their work. Pain is the main problem of this group and affects their daily activities. Therefore, it needs more detailed investigation. In the study of Ilyas and Dharmaji (34), 74.4% and 25.6% of the studied dentists had mild to moderate disability index resulted from LBP (36). Gaowgzeh et al. reported 70% prevalence of LBP among dentists, and 90.5% of the subjects had mild to moderate intensity level and 9.5% had severe (35). In addition to reporting 39.4 percent of neck pain prevalence, Eftekhar Sadat et al. reported the mean of NDI in medical students equal to 14.6 ± 9.7 (mild disability) (36). Moreover, Carreon et al., reported NDI among patients with neck pain equal to 26.5 ± 8.7 (37).

Since studying the amount of pain in addition to the prevalence, a useful tool is to evaluate the effectiveness of ergonomic interventions in the form of before and after study (26). In this study, the prevalence of neck pain and LBP among subjects was reported as 58.1% and 47.3% respectively, as well as LBP and neck pain intensity evaluated by visual analog scale was equal to 75.5% and 49.6%, respectively. In addition, among dentists with neck pain, 46.5% of them were placed in the severe pain class. The results on prevalence and the intensity of pain in the neck and LB areas in the present study are in line with the results of Nadri et al. study (6). In unbalanced forward postures of neck and head to achieve better visibility, vertebrae cannot support the spine for a long time. As a result, neck and upper thoracic spine muscles must be continually contracting to support the weight of the head in forward posture (38). This condition leads to pain patterns and will be characterized as neck tension syndrome with headache and chronic pain in the neck, shoulders, and muscles of the shoulder. So that maintaining contraction of neck muscles will cause weakening and degeneration or herniation of spinal discs (39). Moreover, the results of other studies have reported bending and raising neck, as well as removing shoulder

from the body axis and high activity of arm as the reasons of neck and shoulder pain (40-42). More than 80 percent of dentists complain of back and upper body pain, which is the direct result of posture and movements of dentists in their daily work (43). In a sitting position, lumbar arc drops and prevents LBP (44). It is better for dentists to change their working positions according to the involving muscle group as much as possible (45). Changing the sitting and standing positions can be an effective strategy since those dentists who were working only in the sitting position had more LBP than those with rotating standing and sitting position (46). In this study, a significant difference was found in the incidence of LBP and neck pain associated with daily exercise. Therefore, NDI, LBPDI, LBP and neck pain intensity were higher in the non-exercising dentists. It can be stated that despite pain is multi factorial, it seems that by strengthening the muscles of the shoulder girdle and neck, straightening muscles of the spine and abdominal muscles and increasing muscle power, the pressure on discs and spinal joints will decrease. At the end, it leads to reduction of pain and prevents the incidence of this complication in these dentists. Results of various studies have shown the effect of different exercises on reduction of the pain (47, 48). Nevertheless, the results of some studies do not match with our findings (36, 49).

In the present study, NDI, LBPDI, LBP and neck pain intensity had a significant relationship with BMI, and dentists with higher disability index and pain intensity had a higher BMI. This finding is aligned with the results of Eftekhar Sadat et al. (36) and Youdas et al. studies, that reported higher risk of developing LBP in women weighing more than 100 kg and in men with a height greater than 180 cm (11). In addition, Makela et al., reported high weight as an important factor in neck pain (50). In another study, a higher prevalence of neck pain had been reported in people with a BMI less than 15 (51). However, in the present study, a significant statistical

relation was not reported between neck pain and LBP intensity with variables such as sex, age, and work experience, that is aligned with the results of many other studies (5, 6, 51, 52).

## Conclusion

The results of the present study suggest a high prevalence of neck pain and LBP among studied dentists. The results of studying pain intensity and disability caused by neck pain and LBP indicated that more attention is required towards improving working conditions for dentists using long-term training courses to become familiar with ergonomics, using ergonomic equipment adapted to anthropometric dimensions of users, involvement in sports and appropriate corrective action programs in the workplace, planning and management of work and rest schedules, and even inclusion of these issues in the form of training courses. The small sample size and the study conduction in one dentistry clinic were the limitations of this study, therefore it is better to conduct similar studies in large and different populations.

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