SUPPLEMENT

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Risk factors associated with work-related musculoskeletal disorders in dentistry

Abstract

Purpose: To evaluate musculoskeletal system-related complaints; identify regions at risk in dentists by observing and inquiring the dentists at work; and find out the associations with age, sex, working years, academic position and departments, positions during work and daily working hours.

Methods: Modified Nordic Questionnaire (m-nMQ) was used to evaluate pain, hospital admissions and absenteeism. Quick Exposure Check (QEC) form was utilized to assess risk exposure levels related with low-back, neck, hand-wrist and shoulder-arm.

Results: 163 dentists were included the most painful regions were found to be back (66.9%), neck (65%) and low back (64.4%). Musculoskeletal symptoms were more prevalent in women and research assistants. QEC scores were found to be lower in those who performed regular exercises.

Conclusion: Dentists should be educated about ergonomics at the beginning of their professional life.

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Musculoskeletal disorders (MSD) are significant occupational health problems that affect muscles, tendons, ligaments, cartilage, joints, nerves and blood vessels. Limited movement areas and poor posture of dentists during their work, due to limited visual sights, result in musculoskeletal disorders [1]. A recent review reported the prevalence of general musculoskeletal pain in dental professionals between 64% and 93% [2]. This widespread problem in dental practitioners may require substantial medical care, cause absenteeism from work or even lead to long-term disability. Despite this, little is known about the prevalence and distribution of MSD among Turkish dentists [3].

The first aim of this study was to describe the prevalence and distribution of symptoms of MSD occurring in dentists working in Gazi University Faculty of Dentistry in Ankara, Turkey. The second aim was to determine the relationship of these musculoskeletal complaints with demographic factors, working years, academic position and departments, positions during work and daily working hours. In this way, we aimed to define the risk factors for MSD in dentists.

Methods

Ethical approval for this study was obtained from the Gazi University Human Ethics Sub-Committee in 2009. A random sample of 163 actively working dentists, dental students and research assistants at different departments was included.

We used the Turkish version of the Quick Exposure Check (QEC), which is an observational and largely reliable assessment technique to evaluate the exposure to risk factors of MSD and the changes in exposure [4,5]. The exposure was assessed as low, medium, high and very high according to the scores [5,6]. QEC also assessed work pace and stress. When determining the score of work pace, subjects were asked how often they had difficulty while working; when determining the stress scores, subjects were asked how much they were stressed while working. After recording the demographic data of the subjects, pain in nine anatomical regions, hospital admissions and absenteeism in the last 12 months and the last week were inquired using musculoskeletal symptoms modified Nordic Questionnaire (m-NMQ) [7].

Additional information was requested on age, gender, anthropometry, regular exercise habits, number of years since graduation, field of dental practice, hours worked per day, and hand dominance. Subjects doing exercise at least twice a week for more than 40 minutes each time were classified as having regular exercise habits.

Statistical analysis

Data were recorded into a spreadsheet program before being analyzed by SPSS. Mann-Whitney U test was used to compare two independent groups and Kruskal-Wallis test was used to compare more than two independent groups. Chi-square test was used to investigate correlations between categorical variables between the two groups. Spearman correlation coefficient was used to investigate correlations between variables. As to descriptive statistics, proportion was used in quantitative variables and median (min-max) was used in qualitative variables. A p value $p < 0.05$ was considered as statistically significant.

Results

One hundred and sixty three subjects participated in the study: 55% of them were male; and, 55 of the subjects were university professors, 59 were research assistants and 49 were students. The distribution of departments of participants excluding the students is summarized in Table 1. Among the departments and the groups of academic position, the distribution of gender was similar.

Prevalence of musculoskeletal complaints was recorded. The most prevalent musculoskeletal complaint was back pain (67%), neck pain (65%) and low back pain (64%). Female subjects were found to rate symptoms more frequently than males and especially hand-wrist pain was more likely to be reported ($p=0.006$).

Analysis of distribution of MSD among the groups of academic position showed that neck pain and shoulder pain were more likely to be seen in research assistants while elbow pain was more likely to be seen in professors ($p=0.033$, 0.004 and 0.015 , respectively). Research assistants were found to have a higher proportion of back, low back, hand- wrist and foot pain than others but the difference was not statistically significant.

According to QEC scores, exposure levels of low back, shoulder/arm, hand/wrist and work pace were found to be moderate; neck and stress were found to be high. QEC scores were not related to age, gender and BMI. Daily working hours was positively related to QEC scores ($p < 0.001$). All QEC scores except for stress score was significantly high in research assistants (all $p < 0.001$).

Work pace and stress scores were significantly related to MSD ($p < 0.05$). One hundred and ten subjects (67.5%) defined no or sometimes difficulty while working. Only 27 subjects defined no stress or minimal stress.

TABLE 1. Demographic features of subjects

	<i>Subjects (N=163)</i>
Age (years)	31.9±10.9
Gender (F/M)	74/89
BMI (kg/m ²)	25.0±4.2
Dominant hand (R/L)	150/13
Academic position	
Professor	55
Research Assistant	59
Student	49
Department	
Periodontology	23
Maxillofacial Surgery	22
Prosthesis	22
Pedodontics	17
Orthodontics	15
Treatment	15

F; female, M; male, BMI; body mass index, R; right, L; left. The values are shown in mean±SD or number.

Hand symptoms were investigated with the questionnaire and included night pain and tingling, weakness, pallor (coolness), and blue and black swelling (27.6%). Hand symptoms were more likely to be reported by female dentists (64.4%) and research assistants (42.2%). Hand symptoms were more common in the dominant arm (62.2%) than non-dominant arm. The percentage of bilateral symptoms was 31.1 % (Table 2).

Discussion

In this study we have evaluated the prevalence of MSD symptoms among dentists and the prevalence of symptoms reported by the respondents was very high; 95% of respondents reported having at least one MSD symptoms. Alexopoulos and Marshall found lower MSD symptom prevalence rates compared with those found in our study, 62% and 82%, respectively [8,9]. In a survey of Danish dentists, 50% and 65% reported a 12 months prevalence of low back and neck/shoulder pain, respectively [10]. A study from Australia, reported that 57.5%, 54% and 53.7% of dentists had

TABLE 2. Distribution of hand symptoms

	<i>Subjects (N=45)</i>
Gender	
Female	29 (64)
Male	16 (36)
Academic Position	
Professor	14 (31)
Research Assistant	19 (42)
Student	12 (27)
Involvement	
Dominant Hand	28 (62)
Non-Dominant Hand	3 (7)
Bilaterally	14 (31)

The values are given as number (%).

experienced musculoskeletal symptoms on the neck, lower back and shoulder, respectively [11]. A study of Polish dentists found that most symptoms were associated with back/low back pain (60.1%), neck pain (56.3%), lower extremities (47.8%) followed by the wrist and hand (44%) [12]. Shaik *et al.* reported the ratio of back pain or neck pain among dental surgeons as 83.3% and 70%, respectively [13]. In a recent study, Park *et al.* defined the low back and neck as the most risky regions of body for the dentists developing MSD [14]. In our study, the back pain was the most prevalent complaint (66.9%), followed by neck (65%) and lower back pain (64.4%). Concomitant with the literature, in our study the most prevalent musculoskeletal complaint was back pain, followed by neck and low back pain.

MSD usually develop as a result of the cumulative exposure to various risk factors [1]. It was found that the prevalence of MSD was positively associated with increasing age [3,15] and negatively associated with the years of dentistry practice and clinical experience [16]. OEC form used in this study also showed declining scores as age increased. This correlation was also found in a study conducted among Danish dentists, where neck pain was less common in older groups [10]. A possible explanation is that experienced dentists are better at adjusting their working position and techniques in order to avoid musculoskeletal problems, when compared to their less experienced colleagues [16,17]. Furthermore, less

experienced dentists suffer more psychological stress, which may also affect musculoskeletal system [18]. In this study, subjects with MSD also showed higher stress scores on the QEC Form. This is consistent with a previous report, which showed an association between musculoskeletal problems and increased levels of stress at work among dentists [19].

Female dentists reported more frequent pain in this study. Concomitant with our results, a relationship has been reported between female gender and low back and shoulder pain [8], and also that females suffered more frequent pain and more severe symptoms [9]. Another study reported that female dentists were at higher risk for neck pain and for discomfort and pain in the shoulder and hand than males [20].

Limitations of this study are as follows: severity of the symptoms, rest breaks and number of days on which the dentists could not work were not inquired. In addition, functional limitations and quality of life were not evaluated. Furthermore, after regions at risk were identified by means of questionnaires, no ergonomic intervention was undertaken; however, ergonomic training is planned to be delivered.

Conclusion

MSD is a significant occupational health problem in dentistry; for those working both at departments and at academic positions. This study clearly demonstrated that neck, low back and back are anatomically more at risk than the other regions of the body in terms of MSD, and women and research assistants are at a higher risk of suffering MSD. We have determined that the longer the daily working duration, the more probable to suffer from MSD. Furthermore, the level of stress is quite high in those with MSD.

In the light of such findings, dentists should be delivered ergonomics training before and after the graduation for more effective use of the body and dental equipment. Dentists should receive training on how to cope with stress and awareness raising activities should be conducted for dentists about exercises that increase muscle strength, duration, coordination and elasticity of the tendons and ligaments

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