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Prevalence of Work-related Musculoskeletal Symptoms among Dental Students at Ss. Cyril and Methodius University Dental School in Skopje

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Abstract

AIM: The aim of the study was to investigate the prevalence of work-related musculoskeletal problems in 3rd, 4th, and final year of study in Ss. Cyril and Methodius University Dental School.

METHODS: All 3rd, 4th, and final year regular dental students were invited to take part in the study, which involved completing the extended Nordic Musculoskeletal Questionnaire. This questionnaire facilitates an assessment of troubles (ache, pain, or discomfort) with neck, shoulders, upper back, elbows, wrists/hands, low back, hips/thighs, knees, and ankles/feet.

RESULTS: Out of a maximum possible number of 146 students, 116 agreed to participate and completed the questionnaire (33 males and 83 females). The response rate was 79.5%. The mean age of students was 22.6 years (SD = 1.52), ranging from 20 to 26 years. During the past 12 months, students have problems mostly with neck 48 (41.4%), upper back 43 (37.1%), and low back 43 (37.1%). Working hours/week was 12 h for 3rd year, 20 h for 4th, and 30 h for 5th-year students. There is a significant difference between the students from third study year with these from 4th and 6th study year regarding the neck (χ^2 (2)= 6.46, $p < 0.05$), upper back (χ^2 (2) = 7.38, $p < 0.05$), and low back (χ^2 (2)= 13.79, $p < 0.05$).

CONCLUSIONS: This study reported high prevalence of musculoskeletal symptoms among the dental students. Preventive measures and more ergonomic recommendations are indicated.

Introduction

Musculoskeletal pain is one of the most significant occupational health hazards for healthcare professionals. Dentistry, particularly general dentistry, is considered to be one of the highest-risk professions for developing these problems, primarily due to high visual demands that result in prolonged static positions being adopted by clinicians, with movements being limited to the hand and wrist [1], [2].

Despite having physical and psychological effects, professional disorders can impact the worker's economic state and well-being on a larger scale, which contributes to more frequent absence from work and early retirement [3]. Based on the data received from the occupational information network and US Department of Labor database, dentistry was ranked first as a profession that has the worst impact on the health of the worker [4].

Musculoskeletal disorders (MSD) are one of the most common types of work-related diseases that affect health workers, especially dentists. There are multiple factors that contribute to the formation of the MSDs among the dentists [5]: Continuous movements, insufficient lighting, improper of the body during work, psychological stress, genetics, physical conditions, age, and weight [6], [7]. On the other hand, some studies have shown that musculoskeletal pain was negatively correlated with years of experience [8], [9]. It has been hypothesized that more experienced dentists learn to adjust their work posture to avoid such problems, or that those dentists with severe work-related MSDs have left the profession [10]. Therefore, this suggests that even dental students can manifest early signs of MSD during their years of training. These findings were supported by research that revealed that more than 70% of dental students experienced neck, shoulder, and lower back pain (LBP) as early as the 3rd year of their dental training [11], [12].

An assessment of the MSD among the dental students and the underlying factors associated with it is required to more clearly elucidate the nature of this important issue for dental students [13]. Ergonomics is a science that is concerned with design of products and regulations that assure maximal utility and safety

during work. It also studies the relationship between the worker, the equipment, and the work environment. The implementation of ergonomic conditions and principles in the work place is important element in the prevention of MSDs and the improvement of the productivity and effectiveness of the dentist for a longer period of time [10].

Having this into consideration, the aim of the study was to investigate the prevalence of work-related musculoskeletal problems in 3rd, 4th, and final year of study in Ss. Cyril and Methodius University Dental School.

Methods

This cross-sectional descriptive study was conducted in October 2018 at the Ss. Cyril and Methodius University Dental School. This study examined a sample of 116 regular dental students of 3rd (33), 4th (47), and final year (36) of their study, neither of them was married or had children. They were given to complete an extended Nordic Musculoskeletal Questionnaire [14]. This questionnaire facilitates an assessment of troubles (ache, pain, or discomfort) with neck, shoulders, upper back, elbows, wrists/hands, low back, hips/thighs, knees, and ankles/feet. The second part was consisted of questions addressing the MSDs, the presence of genetic predisposition, the frequency of pain-killer usage, and questions regarding diagnosis and request for medical help among patients with these disorders in past 12 months. The obtained results were analyzed with descriptive statistical analysis and Chi-square test.

Results

Out of a maximum possible number of 146 students, 116 agreed to participate and completed the questionnaire (33 males and 83 females). The response rate was 79.5%. The mean age of students was 22.6 years (SD = 1.52), ranging from 20 to 26 years (Table 1). Working hours/week was 12 h for 3rd year, 20 h for 4th, and 30 h for 5th-year students.

Table 1: Participants of the study

Demographic characteristics	n	Mean (SD)	Total
Age			
M	33	23.1 (SD = 1.56)	Min–Max = 20–26
F	83	22.4 (SD = 1.49)	Mean = 22.6 (SD = 1.53)
Height			
M	33	180.5 (SD = 5.77)	Min–Max= 155–193
F	83	169.1 (SD = 6.40)	Mean = 172.3 (SD = 8.08)
Weight			
M	33	77.5 (SD = 13.95)	Min–Max = 55–95
F	83	61.3 (SD = 9.99)	Mean = 75.0 (SD = 13.39)

Table 3: Upper back pain

Upper back during past 12 months	3 year	4 year	5 year	Total
Students without upper back pain				
Count	26	30	17	73
% within upper back	35.6	41.1	23.3	100
% within year	78.8	63.8	47.2	62.9
Students with upper back pain				
Count	7	17	19	43
% within upper back	16.3	39.5	44.2	100.0
% within year	21.2	36.2	52.8	37.1

During the past 12 months, 48 students had problems mostly with neck (Table 2), 43 with upper back (Table 3), and 43 with lower back 43 (Table 4). There are no significant differences between the groups for the other regions (shoulders, elbows, wrists/hands, hips/thighs, knees, and ankles/feet).

Table 2: Neck pain

Neck pain during past 12 months	3 year	4 year	5 year	Total
Students without neck pain				
Count	23	30	15	68
% within neck	33.8	44.1	22.1	100.0
% within year	69.7	63.8	41.7	58.6
Students with neck pain				
Count	10	17	21	48
% within neck	20.8	35.4	43.8	100.0
% within year	30.3	36.2	58.3	41.4

Our study showed that as many as 58.3% of students in their last year of study complained of neck pain in the last month and 41.4% in the past 12 months (Table 2). There is a significant difference between the students from 3rd (20.8%) study year with these from 4th (35.4%) and 5th (43.8%) study year regarding the neck (χ^2 (2) = 6.46, $p < 0.05$). There are no differences between students from 4th and 5th year of study.

Table 4: LBP

Lumbar region during last 12 months	3 year	4 year	5 year	Total
Students without LBP				
Count	28	30	15	73
% within lb2	38.4	41.1	20.5	100.0
% within year	84.8	63.8	41.7	62.9
Students with LBP				
Count	5	17	21	43
% within lb2	11.6	39.5	48.8	100.0
% within year	15.2	36.2	58.3	37.1

LBP: Lower back pain

Problems with the upper back were reported by 31% in the last month and 37.1% of students in the past 12 months. Most of the students who had problems with upper back were from 4th and 5th year of study (39,5% and 44,2%). There is a significant difference between the students from 3rd study year with these from 4th and 5th study year regarding the upper back (χ^2 (2) = 7.38, $p < 0.05$). Compared to the year of study, as many as 52.8% of the surveyed students from the 5th year of study complained of the upper back pain.

Problems with the lumbar region were reported by 36.2% of students in the last month and 37.1% in last 12 months. Most of the students who had problems with upper back were from 4th and 5th year of study (39,5% and 44,2%). There was a significant difference between the students from 3rd, 4th, and 5th year of study (χ^2 (2) = 13.79, $p < 0.05$) regarding the lumbar region. Compared to the year of study, as many as 58.3% of the surveyed students from the 5th year and only 15.2% from the 3rd year of study complained of the lumbar region pain.

Discussion

The term MSDs refer to injuries that affect soft tissues such as muscles, tendons, ligaments, joints, cartilage, and the nervous system. These conditions most often affect the arms and back and are known as cumulative disorders caused by trauma, repetitive movements, stress, or as a syndrome of occupational overload. MSD develops gradually within weeks, months, and years and in a longer period of time may cause disabilities.

The modified Nordic questionnaire used in this study is considered to be an acceptable method to measure the prevalence of musculoskeletal pain and has been used in a number of other similar studies [14], [15]. As participants of this study provided self-reported information, there is the potential for bias, and it could be suggested that more accurate results could be obtained using physical examinations and assessments [16].

Many authors in their studies found that there was a high prevalence of musculoskeletal pain in the upper back, lower back, and neck regions of undergraduate dental students [11], [12], [13]. Vijay and Ide in their cross-sectional study reported that the prevalence of musculoskeletal pain in their study (79%) is in line with similar studies for both dentists, ranging from 64% to 93% and dental students, ranging from 46% to 86% [17].

Al Wazzan *et al*. presumed that the number of years of practice has an essential part in the occurrence of MSDs, even though younger and older dentists equally reported the same symptoms, as confirmed in the present study [18].

Other studies highlight and support the established fact that work-related MSDs (WMSD) are a major concern for dental students during their training years [19], [20].

The prevalence of occupational LBP and neck pain in dentists was reported between 33% and >55% [21], [22], [23].

In our study, there was also a high prevalence of musculoskeletal pain in the upper back, lower back, and neck regions of undergraduate dental students especially during the past 12 months. Female students made up 71.5% of respondents in this study. There was a significant difference in these three regions between the students from 3rd with 4th and 5th year of study (there are no differences between 4th and 5th year).

However, the young general dental practitioners often work over 8 h a day in the earliest years of their practice, which trigger premature occurrence of MSDs within 3 years [24].

Some authors reported increase in pain prevalence with the number of years spent in the dental school and this was more related to students in clinical years acquiring clinical skills and providing routine dental procedures [11].

Working hours/week in our study was 12 h for 3rd year, 20 h for 4th, and 30 h for 5th-year students, which can be one of the reasons for the difference between students from 3rd and 4th/5th year of study.

The results presented in other study revealed a significant difference in the prevalence of discomfort and WMSD symptoms between dental students in their clinical and non-clinical years. This can be attributed to difference in the nature of work, practicing pattern, and working hours between clinical and non-clinical years of dental education. Khan in their study indicated that the number of clinical working hours per 0 week were statistically significant risk factors especially for hand and finger discomfort. Students with increased number of working hours per week were much more likely to report discomfort in hands and fingers [25].

A literature search revealed that forward head posture and neck position may predispose to tension neck syndrome with associated symptoms of pain, stiffness, and muscle spasm with referring pain between shoulder blades and these findings were in agreement with the findings of this study [26].

Bending and twisting of the neck during clinical work were found to be highly associated with neck and upper-back discomfort and this finding was consistent in the literature as neck extension, flexion, and rotation were identified as possible risk factors contributing to neck discomfort and pain [27].

Our study identified neck pain as being the most prevalent area of musculoskeletal pain (41.4%) especially in 5th-year students, where the number of students who complained of neck pain is almost twice as high as in 3rd-year students with the same problems. This may be due primarily to poor body posture when working with patients as well as most practical classes in the 4th and 5th year.

Rising *et al*. reported that there was a significant year-by-year increase of a perception that dental procedures aggravate musculoskeletal pain among dental students from California [11].

Furthermore, hand pain was present with a significantly lower percentage compared to the pain in the back, neck, and shoulders which is connected and dependent on the area of specialty. Our research included students attending practical classes in different dental areas of specialty, which share similar positioning of the neck, shoulders, and spine while working. The application of force at work and the machine vibrations are connected to only few dental areas that require usage of hands and fingers, which gives us the reason behind low percentage of complaints connected to hand and finger disorders.

The present findings show that pain in the upper and lower back, increased with the increased years of practice supporting previous findings.

This finding is significant as highlighted in a study by Myers and Myers which showed that the main health complaint among dentists – causing chronic concern, medical care and leading to absenteeism – was LBP, quoting a slightly higher prevalence of 62% [28].

Working environment and its characteristics were considered as major factors affecting the prevalence of MSD [29], [30]. Having a comfortable dental chair with a back support is likely to decrease the prevalence of lower back discomfort [25].

Vijay and Ide found that there is a significant association between the presence of LBP and the sitting position using a comfortable work stool ($p < 0.05$) and having a back support ($p < 0.05$). This means that students who used a comfortable work stool with a back support were less likely to have LBP. In regards to the dental stool, it is recommended to obtain a stool that offers neutral back, neck, and shoulder support for optimal posture and possesses an adjustable height and tilt [17].

In our study, most students work with patients in a standing position, which can be one of the reasons for the pain in the upper and lower back. It has been proven that postures which may exert a higher pressure on intervertebral disk as well as prolonged spinal hypomobility are among important factors leading to degenerative changes in the lumbar spine and subsequent LBP.

Pargali found that the distribution of work-related risk factors did not significantly different between those dentists with and without pain complaint, so they concluded that dentistry is probably not an initial factor for development of neither LBP nor neck pain, but it could accelerate the process and thus, increase the severity of symptoms [27].

Poor posture in dentists frequently leads to MSD, which can result in dentists reducing their working hours and taking early retirement [31].

There are a number of different approaches which have previously been suggested to prevent the onset and progression of occupational musculoskeletal pain, including improving physical fitness, improving work posture, regular stretching, and health promotion [29], [30].

Due to its ability to improve musculoskeletal and cardiovascular function, physical exercise may be useful for improving back function and preventing development of work-related MSDs [7], [32]. Some studies suggest that ergonomic advice on improving physical activity should be offered during the process of education [33].

Conclusions

This study reported high prevalence of musculoskeletal symptoms among the dental students. Preventive measures and more ergonomic recommendations are indicated.

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