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ORIGINAL RESEARCH

Musculoskeletal Disorders and Stress among Moroccan Dentists: A Cross Sectional study

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ABSTRACT

Background and aim: Dentists' treatment tasks require repetitive actions, uncomfortable postures, and intense effort, all of which can lead to health disorders. The aim of the study was to describe the prevalence of musculoskeletal disorders among Moroccan dentists and the factors associated with these diseases.

Material and methods: To conduct a descriptive cross-sectional survey, an anonymous questionnaire on occupational health problems was distributed to a representative sample of 310 Moroccan dentists. Sample size calculation and sampling were performed using Epi info software. Data were analyzed using the SPSS (Statistical Package for the Social Sciences) software. The associations among the frequency of variables were evaluated by the chi-square test ($P < 0.05$).

Results: Out of 310 questionnaires distributed, we received 286 responses, for a response rate of 95.33%. A total of 286 dentists were included in our survey. The mean age of the participants was 41.19 (±7.63) years. The results showed that 62.9% of the surveyed dentists complained of musculoskeletal disorders. Moreover, 79.4% of practitioners had high stress levels. Concerning sports activity, 55.9% of the practitioners practiced a sport activity.

Conclusions: For Moroccan dentists, the occurrence of musculoskeletal pain is a critical problem. Considering the scale of the problem, it is necessary to implement education in ergonomics among dentists and dental students, and to promote the holistic health of dental professionals. As musculoskeletal pain is a critical issue for Moroccan dentists, it's judicious to consider ergonomics courses at the beginning of dental education programs, then every year until graduation, and to provide professional dentists with continuous training all along their careers.

KEYWORDS: Musculoskeletal disorders, Moroccan dentists, stress, dental ergonomics.

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INTRODUCTION

Musculoskeletal disorders (MSDs) are multifactorial diseases with an occupational component. MSDs may cause any of the following symptoms/complaints: pain, paresthesia, stiffness, swelling, redness, and/or weakness. The factors that cause MSDs are biomechanical and related to psychosocial and organizational constraints. Certain risk factors can promote the development of MSDs [1]. Biomechanical hazards include work posture, simple or repetitive movements, and forces imposing stresses on the body that may cause or contribute to an injury or disease affecting the musculoskeletal or neurological systems [2]. The MSDs suffered by dentists are manifested in intermittent pain in the neck, back, and shoulders, tingling fingers, muscle fatigue, muscle stiffness, and mild limitation of the full range of motions. Psychological hazards include stress, chronic fatigue, and burn-out syndrome [3]. Exposure to psychosocial risks in the workplace produces not only psychological damage such as depression and anxiety but also somatic disorders such as cardiovascular disease, hypertension, neurological

disorders, etc. Indeed, stress has a direct effect on muscle spasms, which indirectly causes pain in parts of the body like the neck, shoulders, and lower back. Dentists consider their profession to be more stressful than others. Stress is often related to anxiety, physical or emotional exhaustion, dealing with difficult and uncooperative patients, time management, workload, and the constant quest for technical perfection. This stress has a direct effect on headaches, neck, shoulder, and back pain. The awareness of health professionals about the presence of risk factors in the workplace is of great importance, as it allows the analysis of psychosocial factors, workload and pace, social environment, and interpersonal relationships. Little information is available on MSDs and the degree of work-related stress among private dentists in Morocco. For these reasons, the objective of our study is to determine the prevalence of MSDs in a population of Moroccan dentists.

MATERIALS AND METHODS

This is a descriptive cross-sectional survey, involving musculoskeletal disorders among private sector dentists in the city of Casablanca registered with the National Order of Dentists.

Sampling criteria:

Random sampling from a list of 1560 dentists supplied by the National Council of Dentists allowed us to obtain a representative sample of 310 dentists. The sample size was calculated using the Epi info software.

We have excluded dentists suffering from hereditary or autoimmune diseases likely to directly cause musculoskeletal disorders.

To collect the data necessary for this study, a questionnaire comprising 4 parts was designed:

- The first part relating to sociodemographic data.
- 2nd part: Musculoskeletal disorders and working conditions.
- 3rd part: Health of the practitioner.
- 4th part: Professional stress.

Statistical analysis:

The statistical analysis was performed using SPSS (Statistical Package for the Social Sciences) software version 22.0 (SPSS, Chicago, Illinois) at the Laboratory of Epidemiology and Biostatistics of the Faculty of Dentistry of Casablanca, Morocco. The results were expressed by their mean and their standard deviation (±SD) for the quantitative variables and by effectives or numbers and percentages for the qualitative variables. The chi-square test was used to compare qualitative variables. Statistically significant differences were evaluated with significance set at $P < 0.05$.

RESULTS

A total of 286 (156 female and 130 male), aged 41.19 ± 7.63 years, completed the questionnaire. 91.3% were general dentists, and 8.7% were exclusive specialists. The mean number of years of dental practice was 16.05 ± 7.56 years. The majority of dentists (95.5%) worked between 4 and 8 hours per day. Our study showed that 61.9% took a break during their work apart from the lunch break.

Regarding sports activity, our study showed that 55.9% (n=160) of the dentists practiced a sports activity. 18.5% practiced walking, 13.6% weight training, 7% jogging, and 16.8% practiced several sports activities, such as swimming, yoga, tennis, volleyball, soccer, and golf.

The frequency of sports practice was 21% for once a week. Furthermore, this sport activity was irregular for 12.9% (Table 1).

Table 1. Characteristics of study population.

	N	%
Gender		
Female	156	54,5
Male	130	45,5
Type of exercise		
General dental practitioner	261	91,3
Dental specialist	25	8,7
Working hours		
Between 4-8H	273	95,5
More than 8H	11	3,8
Less than 8H	2	0,7
Break time		
Yes	177	61,9
No	109	38,1
Practice of sport		
Yes	160	55,9
No	126	44,1
Once a week	60	21
Twice a week	32	11,2
Irregularly	37	12,9

The result showed that 62.6% (n=179) of the surveyed dentists had at least one musculoskeletal disorder such as low back pain, neck pain, carpal tunnel syndrome, muscle pain, and joint pain.

All practitioners with musculoskeletal disorders reported that they occurred during their practice years.

Out of the 179 practitioners with musculoskeletal disorders, 53.8% (n=154) reported having received an ergonomics course during their undergraduate dentistry program, and 49.3% (n=141) were aware of the different ergonomic positions but rarely followed them. (Table 2)

Table 2. Data on musculoskeletal disorders and ergonomics among dental practitioners

	N	%
Musculoskeletal disorders		
Yes	179	62,6
No	107	37,4
Date of occurrence		
During	179	62,6
Before	0	0
Ergonomics education		
Yes	154	53,8
No	25	8,7
Continuing education in ergonomics		
No	179	62,6
Yes	0	0
Knowledge of ergonomic positions		
Yes	141	49,3
No	38	13,3

The result also revealed that job stress was high in 79.4% (n=227) of our study population. 55.6% (n=159) of practitioners rated their work as the main cause of their stress. 30.4% (n=87) rated their financial situation as the main cause. (Table 3)

We also associated the variables age, type of exercise, sport, and work hours with musculoskeletal disorders affecting our sample of dentists. It appeared that females

were more exposed than males, but this observed difference was not statistically significant. The number of hours worked per day was not significantly associated with MSDs either (P > 0.05). (Table 4)

The association between sports or not, working hours with MSDs did not show a statistically significant difference. (Table 4)

General practitioners had a very high level of stress and appeared to be at greater risk of developing MSDs. (Table 5)

Table 3. Distribution of the sample by practitioner stress

	N	%
Degree of stress		
High (7-8)	227	79,4
Very high (9-10)	32	11,2
Average (4-6)	27	9,4
Cause of stress		
Work	159	55,6
Finance	87	30,4
Family	40	14

Table 4. Gender, specialty, sport, and working hours correlated by MSDs and stress

	MSDs (%)	P-value
Gender		
Female	52	0,25
Male	48	
Type of exercise		
General practitioner	91,6	0,78
specialist	8,4	
Sport		
Yes	56,4	0,83
No	43,6	
Total working hours		
<8H	97,2	0,34
≥8H	2,8	

Table 5. Level of stress among dental practitioners

	N	%
Stress		
Moderate	27	9,4
High	227	79,4
Very high	32	11,2

DISCUSSION

Musculoskeletal disorders and dentistry

Musculoskeletal disorders are common in dentistry. In this study, 62.6% of dentists reported having at least one musculoskeletal disorder. Although we did not differentiate between neck and back pain, since both symptoms were assessed in a single question, the most common are low back pain, neck pain, and shoulder pain [3,4].

The prevalence of these disorders is also described in other countries. In Poland, 92% of dentists report having had musculoskeletal disorders [5]. In Australia, 88.9% of dentists have had at least one musculoskeletal disorder [6]. In Croatia, a study showed that more than 70% of dentists have musculoskeletal disorders [7]. The same percentage for dentists in Finland, where 70% of the practitioners have musculoskeletal disorders [8]. This can be explained by the poor, static, and prolonged working positions adopted by practitioners.

78% of female dental staff are affected by musculoskeletal pain [9], and in 81% of women working in the dental health field, MSDs are located in the upper extremities (neck, shoulders, arms, wrists, hands) [10]. In our study, the association between gender and musculoskeletal disorders was not statistically significant.

Orthodontists suffer fewer MSDs than general practitioners. They work fewer hours per week but complain of hand and wrist pain [11]. In our study, we did not find a statistically significant difference between dental specialists and general practitioners.

Some studies show that MSDs decrease with age, and this has been explained by dentists' adherence to different ergonomic positions over time, and that more experienced dentists learn to adjust their work posture to avoid these problems [3].

This study showed that although 53.8% of practitioners with MSDs had received previous ergonomic education and 49.3% were aware of the different ergonomic positions, only 3.1% adhered to them consistently.

Anteflexion or rotation of the trunk, as well as lateral tilt or flexion, are positions likely to cause muscular and articular imbalances, dysfunctions, or pain. They require the isometric contraction of more than 50% of the body's muscles to fight against gravity. In fact, in an unsupported sitting position, the physiological lumbar lordosis tends to disappear, which can lead to the appearance of tensions, trigger points, or disc herniations. When sitting for long periods of time, a kyphosis position is frequently adopted to decrease the energy required to maintain the spine vertically [12]. Indeed, static postures are strongly responsible for the etiology of MSD disorders, and it should be the focus of risk assessment by occupational physicians who should develop an effective preventive strategy [13].

Similarly, repeated forward bending of the neck decreases cervical lordosis and leads to chronic neck or shoulder pain, headaches, or possible disc degeneration [8].

Increased working hours tend to exaggerate back and neck pain, a finding felt by practitioners who rate breaks during work as beneficial at 94%.

Indeed, even if we did not find a statistically significant difference between working hours and the prevalence of MSDs, we note that more than 63.7% of dentists with MSDs work between 4 and 8 hours, and 45.5% work more than 8 hours.

Repetitive movements, lack of adjustment of the operating height, the layout of the treatment room, or non-ergonomic instruments can also be responsible for musculoskeletal disorders. Without forgetting the management of disabled patients, those suffering from opening limitations, or agitated patients who are difficult to manage and therefore push the practitioner to adopt positions that are harmful to his health [14].

The practice of sports activity is also an important factor to mention and plays an important role in the prevention of musculoskeletal disorders [15]. In this sense, our study showed that 55.9% of practitioners do not practice sports.

Following training on ergonomics, yoga, or relaxation to reduce stress at work and after work can prevent MSDs.

We associated MSDs with physical activity, but the difference was not statistically significant. More than 63% of dentists who practice sports suffer from musculoarticular pain.

Adopting the right ergonomic positions is the best preventive factor against the occurrence of MSDs. The use of magnifying glasses and indirect vision techniques have a positive effect on reducing musculoskeletal symptoms [16].

To help a dentist work more comfortably, with less fatigue, and extend their career, it is recommended to correct the ergonomic problems in the operatory, consult physical or neuromuscular therapists for MSDs, resolve major trigger points before any strengthening exercise, make some strengthen stabilizing muscles and chairside stretching [17].

Stress and dentistry

The profession of the dental surgeon is stressful, according to the World Health Organization, the profession of the dental doctor is considered the second most stressful profession after that of the police officer [18].

In this study, more than 79% of dentists said they felt high stress at work, and 55.6% of them said that work was the main cause.

This occupational stress is visibly high among dentists in other countries. It reaches 90% of dentists in Malaysia [18], 69% of dentists in Germany [19], and 70% in New Zealand where dentists reported high stress [20]. This high stress is mainly due to work.

Indeed, working conditions, which are physically and psychologically tiring, lead to harmful psychological manifestations, such as stress, anxiety, depression, or burnout. These are problems encountered in daily practice, whether in relation to staff, patients, management of equipment, or financial problems.

Moreover, the practitioner in his office often takes care of difficult patients, uncooperative, children, disabled, or unmotivated patients, sometimes aggressive or violent, as well as "at risk" subjects (suffering from chronic diseases, contagious, immunosuppressed, or in pregnancy). All these elements force the practitioner to pay constant attention to all these gestures and words and can create a feeling of frustration over time [19].

Five factors are implicated in dental burnout: stress, personal time, income, practice management, and professional time [21]. Stress is the factor whose degree we assessed in this study. It can manifest itself at different levels [22]:

At the somatic level: it generates digestive (ulcers) or musculoskeletal, cardiovascular, endocrine disorders, and chronic pain. This relates to the results obtained from 62.2% of practitioners who have at least one musculoskeletal disorder.

At the psychological level: we can mention fatigue, loss of motivation, irritability, nervousness, anxiety, and depression. These manifestations translate into aggressive behavior, instability, and increased tobacco consumption.

At the professional level: stress leads to difficulties in concentration and memorization, hesitations, and errors in judgment.

Finally, stress develops early in careers, and many students are already under certain mental pressures during their initial training (grades, clinical and theoretical exams, practical work, lack of experience, lack of manual dexterity, fear of failure...). Many are worried about treatment plans or care of uncooperative patients [22].

Hence, the interest of prevention is focused on two levels: for students, in faculty, and for newly established practitioners. It is essential to know the causes and consequences of stress and to be able to detect the first signs as soon as they appear.

This exploratory study gave us a global view of MSDs and the degree of stress among dentists in a large city in Morocco. It provided us with figures for further studies, targeting, for example, the type of MSD (cervical, lumbar, etc.), and according to the specialty.

CONCLUSION

Musculoskeletal disorders are various pathologies whose medical consequences can be serious and lead to a real handicap and an inability to work. Dentists are particularly affected.

Despite the limitations of this study, notably the limited number of participants, our study confirmed that MSDs and stress are major health problems for Moroccan dentists in Casablanca.

MSDs can be avoided through a comprehensive preventive approach. A better understanding of the risk factors, the early signs, and the evolution of these conditions helps to prevent their appearance. It can bring to the practitioners an awareness and a questioning of their professional practice and their way of life.

The application of ergonomic and work organization principles, a healthy lifestyle, and the inclusion of exercises that improve physical conditions and stress management are also important.

Awareness of the harmful effects of these disorders should be emphasized from the very first years of study to give oneself the means at the beginning of one's professional career to make it as pleasant and rewarding as possible.

ABBREVIATIONS

MSD: Musculoskeletal disorders
SPSS: Statistical Package for the Social Sciences
SD: standard deviation

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None.

COMPETING INTERESTS

The authors declare no competing interests with this study.

AUTHORS' CONTRIBUTIONS

The participation of each author corresponds to the criteria of authorship and contributorship emphasized in the Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals of the International Committee of Medical Journal Editors. Indeed, all the authors have actively participated in the redaction, the revision of the manuscript, and provided approval for this final revised version.

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