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ERGONOMIC RISK AND MUSCULOSKELETAL PAIN IN DENTAL PRACTICE

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Abstract: **Objective:** Ergonomics in dental practice plays a crucial role in maintaining professional health, as prolonged static postures and repetitive movements significantly increase the risk of work-related musculoskeletal disorders among dental professionals. Understanding ergonomic risk factors and their impact on musculoskeletal health is essential for identifying vulnerable groups and developing effective preventive strategies in dental practice.

Aim: The aim of this study was to assess the occurrence of musculoskeletal pain as a manifestation of work-related musculoskeletal disorders among dentists and to analyze its association with demographic characteristics, work habits, and dental specialization.

Materials and Methods: This cross-sectional study included 130 dentists from various dental specialties. Data were collected using a structured questionnaire addressing demographic variables, work habits, ergonomic conditions, and the presence of musculoskeletal pain. Descriptive statistical methods were applied, and chi-square tests were used to analyze associations between categorical variables, with statistical significance set at $p < 0.05$.

Results: The results indicated that the majority of participants experienced work-related musculoskeletal disorders, with prevalence increasing with age and length of professional experience. Occupational factors such as prolonged sitting or standing, improper working posture, lack of ergonomic chairs, and insufficient physical activity were significantly associated with the occurrence of work-related musculoskeletal disorders ($p < 0.05$). A statistically significant association was also observed between dental specialty and the presence of work-related musculoskeletal disorders ($\chi^2(9) = 25.83$; $p < 0.01$). The highest prevalence was reported among specialists in prosthodontics, pediatric dentistry, orthodontics, and endodontics, while lower prevalence was observed among oral surgeons, general dental practitioners, and periodontists.

Conclusion: These findings emphasize the importance of implementing ergonomic interventions, regular physical activity, and preventive strategies in dental practice to reduce the occupational risk of work-related musculoskeletal disorders.

Keywords: ergonomics, dentistry, WMSDs, musculoskeletal pain, occupational risk, specialization.

INTRODUCTION

Ergonomics is a multidisciplinary scientific discipline that examines the interaction between humans and their working environment, including tools, equipment, tasks, and organizational systems, with the aim of optimizing performance while reducing physical strain, fatigue, and the risk of injury (1, 2). The term ergonomics originates from the Greek words *ergon* (work) and *nomos* (law or system) and refers to an applied science focused on adapting workplaces, instruments, and working procedures to human physical and cognitive capacities in order to promote comfort, efficiency, safety, and long-term well-being. Proper implementation of ergonomic principles not only enhances productivity but also plays a crucial role in the prevention of occupational injuries and chronic health conditions.

The dental profession is particularly vulnerable to occupational hazards due to prolonged static working postures, repetitive movements, sustained fine motor

activity, and high visual and cognitive demands. These factors significantly increase the risk of developing work-related musculoskeletal disorders (WMSDs), which represent one of the most common occupational health problems among dental professionals. WMSDs are often underreported or underestimated in their early stages, despite their tendency to progress into chronic conditions that negatively affect professional performance, work ability, and quality of life. The most frequently reported WMSDs among dentists include neck and lower back pain, shoulder and trapezius muscle strain, tendinitis, carpal tunnel syndrome, neuralgia, and early degenerative joint changes. In addition to musculoskeletal complaints, dentists may also experience visual strain and hearing-related problems as a result of prolonged exposure to dental equipment and specific environmental conditions (3).

Preventive strategies aimed at reducing the risk of WMSDs include maintaining appropriate working posture, using ergonomically designed dental instruments and equipment, optimizing workplace layout, and incorporating regular physical activity, stretching exercises, and short breaks during the working day (4–7). However, despite growing awareness of ergonomic risks, inadequate implementation of ergonomic principles remains common in daily dental practice.

Ergonomics is traditionally divided into three interrelated domains: physical, cognitive, and organizational ergonomics. Physical ergonomics focuses on anatomical, physiological, and biomechanical characteristics and their relationship to physical work demands. Cognitive ergonomics addresses mental processes such as perception, memory, decision-making, and motor control that influence human–system interaction. Organizational ergonomics aims to optimize sociotechnical systems, including workflow organization, work schedules, communication, and team dynamics, in order to improve efficiency and reduce occupational stress (8).

Dental practice requires sustained physical precision and mental concentration, and prolonged working hours combined with insufficient ergonomic awareness often result in awkward postures, repetitive strain, and cumulative biomechanical loading. The development of WMSDs in dentistry is therefore multifactorial, arising from the interaction of biomechanical, biological, physical, chemical, and psychosocial factors. This complexity highlights the need for a comprehensive and multidisciplinary preventive approach (9, 10, 11). Understanding and systematically applying ergonomic principles in dental practice is essential not only for the prevention of WMSDs but also for preserving long-term occupational health, professional longevity, and the quality of patient care.

Study Objectives

The main objective of this study was to assess the prevalence of work-related musculoskeletal disorders (WMSDs) among dentists and to investigate the factors contributing to their occurrence. Specifically, the study aimed to:

1. Examine the relationship between demographic characteristics (age, gender, professional -experience) and the presence of musculoskeletal pain.

2. Evaluate the association between work habits, including posture, use of ergonomic equipment, and frequency of physical activity, with the prevalence of WMSDs.

3. Analyze the distribution of musculoskeletal pain across different dental specialties and identify those at higher occupational risk.

4. Highlight the importance of ergonomic practices in reducing WMSDs and promoting occupational health in dental practice.

MATERIAL AND METHODS

This cross-sectional study was conducted among practicing dentists to assess the prevalence of work-related musculoskeletal disorders (WMSDs) and their association with demographic characteristics, work habits, and dental specialties. A structured, self-administered questionnaire was used as the primary data collection tool. The survey included sections on demographic information (age, gender, years of professional experience), work-related factors (posture, type of practice, use of ergonomic equipment), physical activity habits, and the occurrence and frequency of musculoskeletal pain. Additionally, participants were asked about their dental specialization to evaluate differences in occupational risk. The questionnaire was pilot-tested prior to the main study by approximately fifteen doctors of dental medicine in order to assess its clarity, relevance, and comprehensibility.

A total of 130 dentists participated in the study. Participation was voluntary, and informed consent was obtained from all respondents prior to completion of the questionnaire. The study was conducted in accordance with ethical guidelines for research involving human participants.

Data were analyzed using descriptive and inferential statistical methods. Continuous variables measured on interval or ratio scales were summarized using means and standard deviations, while categorical variables were presented as frequencies and percentages. **Chi-square (χ^2) tests** were performed to assess associations between categorical variables, including musculoskeletal pain, demographic characteristics, work habits, and specialization. **One-way analysis of var-**

iance (ANOVA) was applied to examine differences in continuous outcomes, such as the average number of musculoskeletal pain episodes, across dental specialties. Statistical significance was set at $p < 0.05$. All analyses were performed using SPSS version 26.

RESULTS

Table 2 presents the descriptive indicators of variables measured on an interval/ratio scale. The symbol M denotes the mean value, while SD represents the standard deviation. The results show that, on average, respondents experienced work-related musculoskeletal pain 9.16 times during the past six months. The first occurrence of such pain was reported relatively early, after an average of 1.28 years of work in dental practice.

The level of perceived stress varied depending on the source of stress. The highest level of stress was attributed to work-related factors (M = 6.10), followed by financial factors (M = 4.17), while personal prob-

Table 1. *Descriptive indicators of variables measured on a nominal scale*

Question	Alternative frequency				
	25-35 yrs	**35-45 yrs**	**46-56 yrs**	**56+ yrs**	
1. Age (in years)	81	40	7	2	
	Male	**Female**			
2. Sex	59	71			
	Public	**Private**	**Both**		
3. Type of practice	31	76	23		
	Left	**Right**			
4. Dominant hand	8	122			
	5-10 yrs	**11-20 yrs**	**21-30 yrs**	**31-40 yrs**	
5. How many years have you been in practice?	81	35	12	2	
	Always sitting	**Mostly sitting, sometimes standing**	**Mostly standing, sometimes sitting**	**Always standing**	
6. How do you work in the dental office?	21	60	49	0	
	Yes	**No**			
7. Use of ergonomic chairs	33	97			
	Very good	**Good**	**Average**	**Poor**	
8. How would you rate your posture while performing clinical procedures?	26	48	56		
	Yes	**No**			
9. Do you perform muscle stretches (light exercises) during your workday?	73	57			
	Yes	**No**			
10. Have you attended any continuing education courses or training closely related to ergonomics in the dental profession?	7	123			
	Every day	**5–6 days**	**3-4 days**	**1-2 days**	**Never**
11. How many days per week do you exercise (gym, fitness, aerobics, yoga, Pilates, running, etc.)?	0	6	34	34	56
	Yes	**No**	**Partially**	**I don't exercise**	
12. Do you believe that exercising helps you maintain your work-related physical fitness in dentistry?	73	1	19	37	
	Yes	**No**			
13. Do you experience any work-related musculoskeletal pain?	38	92			
		Work environment	**Existing condition/injury**		
14. What do you consider to be the main cause of your musculoskeletal pain?		128	2		

	Yes	**No**			
15. Have you had to take medication to relieve musculoskeletal pain?	36	94			
	Yes	**No**			
16. Have you ever consulted a physician for work-related musculoskeletal pain?	16	114			
	Yes	**No**			
17. Do you undergo physical therapy related to musculoskeletal pain?	33	97			
	Yes	**No**			
18. Have you tried any alternative methods to manage musculoskeletal pain (e.g., acupuncture, massage)?	56	74			
	Yes	**No**			
19. Do you have any workplace protocols aimed at reducing musculoskeletal disorders?	130	0			
	Yes	**No**	**First dose only**		
20. Have you completed hepatitis B vaccination, including booster doses?	39	43	49		
	Yes	**No**			
21. Do you wear protective glasses/visors while working?	95	35			
	Yes	**No**	**First dose only**		
22. Have you been vaccinated against COVID-19?	83	5	42		
	Yes	**No**			
23. Is adequate protective equipment provided by your employer?	7	123			
	Yes	**No**			
24. Do you have any allergies to substances you are exposed to at work (latex, chemicals, etc.)?	10	120			
	Yes	**No**			
25. Do you have vision problems?	73	57			
	Yes	**No**	**Sometimes**		
26. Do you use dental magnifying loupes while working?	12	96	22		
	Yes	**No**			
27. Are you exposed to X-ray radiation at your workplace (RVG, OPG, 3D CBCT)?	18	112			
	Yes	**No**			
28. If you use X-ray devices, do you monitor the level of radiation your body absorbs (e.g., do you wear dosimeters in the clinic)?		18			
	Yes	**No**	**Partially**		
29. Do you experience any negative effects from working with a polymerization light?	6	62	62		
	Yes	**No**	**Partially**		
30. Does stress from your work environment affect your personal life?	59	9	62		
	Yes	**No**			
31. Have you ever visited a psychologist or psychiatrist due to work-related reasons?	3	127			

Table 2. *Descriptive indicators of variables measured on an interval/ratio scale*

Question	M	SD
1. In the last 6 months, how often have you experienced work-related musculoskeletal pain in dentistry?	9.16	6.16
2. How old were you when you first felt work-related musculoskeletal pain?	1.28	0.45
3. Rate your stress exposure on a scale from 1 to 10: **personal issues**	2.71	1.40
4. Rate your stress exposure on a scale from 1 to 10: **work**	6.10	1.46
5. Rate your stress exposure on a scale from 1 to 10: **finances**	4.17	2.23
6. Do you consider the job of a dentist stressful on a scale 1–10?	6.41	1.12

Table 3. *Correlation of musculoskeletal pain with demographic and occupational characteristics (chi-square tests)*

Question		Do you experience any work-related musculoskeletal pain?		p
		Yes	No	
1. Age (in years)	**25-35 yrs**	4	77	< 0.01
	36-45 yrs	25	15	
	46-56 yrs	7	0	
	56+ yrs	2	0	
5. How many years have you been in practice?	**5-10 yrs**	4	77	< 0.01
	11-20 yrs	20	15	
	21-30 yrs	12	0	
	31-40 yrs	2	0	
6. How do you work in the dental office?	**Always sitting**	2	19	< 0.05
	Mostly sitting, sometimes standing	16	44	
	Mostly standing, sometimes sitting	20	29	
	Always standing	0	0	
7. Use of ergonomic chairs	**Yes**	15	18	< 0.05
	No	23	74	
8. How would you rate your posture while performing clinical procedures?	**Very good**	2	24	< 0.05
	Good	15	33	
	Average	21	35	
	Poor	0	0	
9. Do you perform muscle stretches (light exercises) during your workday?	**Yes**	11	62	< 0.01
	No	27	30	
10. Have you attended any continuing education courses or training closely related to ergonomics in the dental profession?	**Yes**	0	7	> 0.05
	No	38	85	
11. How many days per week do you exercise (gym, fitness, aerobics, yoga, Pilates, running, etc.)?	**Every day**	0	6	< 0.01
	5-6 days	5	29	
	3-4 days	3	31	
	1-2 days	30	26	
	Never	0	0	

lems were rated as the least stressful (M = 2.71). In addition, on a scale from 1 to 10, respondents assessed the dental profession overall as highly stressful, with a mean score of 6.41.

In Table 3, participants' age showed a highly statistically significant association with the presence of musculoskeletal pain ($p < 0.01$). While the majority of respondents in the 25–35 age group reported no such pain, a significantly higher number of participants in older age groups reported musculoskeletal complaints. A particularly pronounced increase in pain prevalence was observed in the 36–45, 46–56, and 56+ age groups, in which almost all respondents reported the presence of pain.

Similarly, length of work experience demonstrated a statistically significant association with the occurrence of musculoskeletal pain ($p < 0.01$). Respondents with shorter work experience (5–10 years) rarely reported pain, whereas the frequency of musculoskeletal complaints increased significantly with a longer duration of professional practice, particularly among those with more than 20 years of work experience.

Working posture in the dental office was also significantly associated with the presence of pain ($p < 0.05$). Respondents who worked predominantly in a standing position with occasional sitting reported musculoskeletal pain more frequently than those who worked mainly in a seated position. None of the respondents worked exclusively in a standing position.

The use of ergonomic chairs showed a statistically significant association with the occurrence of pain ($p < 0.05$). Respondents who did not use ergonomic chairs reported musculoskeletal complaints significantly more often than those who did, suggesting a protective role of ergonomic equipment.

Self-assessment of posture during clinical procedures was also significantly associated with the presence of musculoskeletal pain ($p < 0.05$). Respondents who rated their posture as average or good more frequently reported pain compared to those who rated their posture as very good, among whom the lowest prevalence of pain was observed.

The practice of muscle stretching during the working day demonstrated a highly statistically significant association with the occurrence of musculoskeletal pain ($p < 0.01$). Respondents who did not perform stretching exercises reported pain significantly more often, whereas a lower frequency of pain was observed among those who regularly performed light exercises during work.

In contrast, participation in continuous education or courses in the field of ergonomics did not show a statistically significant association with the occurrence of musculoskeletal pain ($p > 0.05$), which may be attributed to the very small number of respondents who had attended such educational programs.

Table 4. *Frequencies and percentage distribution of different dental specialties in the sample*

Specialty	f	%
General dentistry	40	30.8
Prosthodontics	36	27.7
Endodontics / Restorative dentistry	19	14.6
Pediatric dentistry	11	8,4
Oral surgery	9	6.9
Orthodontics	9	6.9
Periodontics	6	4.6

Table 5. *Differences between dental specialties in the mean frequency of musculoskeletal pain over the past six months (ANOVA)*

Specialty	Average number of musculoskeletal pain episodes in the past 6 months
General dentistry	7.07
Prosthodontics	11.74
Pediatric dentistry	11.33
Endodontics / Restorative dentistry	9.22
Oral surgery	8.00
Orthodontics	11.66
Periodontics	5

Weekly physical activity showed a highly statistically significant association with the occurrence of musculoskeletal pain ($p < 0.01$). Respondents who exercised 1–2 days per week most frequently reported pain, while a substantially lower prevalence of musculoskeletal complaints was observed among those who exercised more frequently or on a daily basis.

Table 5 presents the results of the ANOVA analysis, which indicated a statistically significant difference in the mean frequency of musculoskeletal pain among the observed dental specialties ($p < 0.05$), suggesting that the type of dental practice has a significant impact on the occurrence of musculoskeletal complaints. The highest mean frequency of musculoskeletal pain was observed among respondents working in prosthodontics (M = 11.74), orthodontics (M = 11.66), and pediatric dentistry (M = 11.33). Slightly lower, yet still elevated, values were recorded for endodontics (M = 9.22) and oral surgery (M = 8.00). Conversely, lower mean frequencies of musculoskeletal pain were reported among general dental practitioners (M = 7.07) and periodontists (M = 5.00).

DISCUSSION

This study included 130 dentists employed in private and public dental institutions, with the aim of assessing the prevalence of work-related musculoskeletal disorders, their potential causes, and their association with ergonomic, occupational, and demographic factors. The sample structure showed a predominance of younger working-age individuals, with the majority of participants belonging to the 25–35-year age group, while significantly fewer were represented in older age groups.

Descriptive statistics indicate that musculoskeletal pain appears relatively early in dentists' professional careers, as participants reported experiencing pain for the first time on average after slightly more than one year of practice. At the same time, the average number of musculoskeletal pain sites in the past six months was high, confirming that these complaints are both common and clinically significant among dentists (Table 1). These findings are consistent with previous studies, which suggest that musculoskeletal disorders do not occur exclusively after many years of work experience but can also arise in the early stages of professional development, particularly due to improper posture, repetitive movements, and static load (12–15).

The results of the nominal analysis indicated that the majority of participants work in private practice and predominantly adopt a seated position with occasional standing during work. However, a concerning finding is that most participants do not use ergonomic chairs, despite a large number of them rating their posture during work as average or good (Table 1). This discrepancy between subjective assessment of posture and objective ergonomic conditions is frequently reported in the literature and may indicate insufficient awareness of proper ergonomic principles or adaptation to suboptimal working conditions (16).

Analysis of stress levels revealed that participants perceive the dental profession as highly stressful, with an average stress rating above the midpoint of the scale. Although participants differentiated between sources of stress (personal, professional, and financial), the overall perception of dentistry as a stressful profession further underscores its complexity, where physical strain is often combined with psychological demands, responsibility toward patients, and high expectations regarding precision and quality of work (Table 2) (17–22).

Regarding daily physical activity, a significant portion of participants either do not exercise or exercise very infrequently (e.g., gym training), although the majority recognize the positive impact of physical activity on work-related fitness. A smaller number of participants use pharmacological therapy, consult a physician, or opt for alternative treatment methods, which may indicate a normalization of pain as an "integral part" of the profession. Notably, none of the participants reported the existence of a formal workplace protocol for the prevention of musculoskeletal disorders, despite the recognized need for its implementation (Table 1).

Analysis of the association between musculoskeletal pain and demographic and occupational characteristics showed that both age and length of professional experience were highly statistically significantly associated with the occurrence of pain. In older age groups and among participants with longer professional tenure, the frequency of musculoskeletal complaints was substantially higher, consistent with the cumulative effect of prolonged biomechanical load (Table 3).

In addition to biomechanical factors, dentists are exposed to numerous biological, chemical, physical, and psychogenic risks, including infections, allergies, radiation, noise, artificial lighting, polymerization light, and chronic stress. Although most participants reported adequate vaccination against hepatitis B and COVID-19, as well as the use of basic protective equipment, few had access to complete and adequate protective equipment provided by their institution, further highlighting the need for systemic improvement of working conditions (23).

In this study, more than 75% of participants reported not using magnifying loupes during work. A study conducted in Beijing investigated the impact of using magnifying loupes and microscopes among prosthodontic specialists during tooth preparation for prosthetic procedures, with the aim of analyzing posture and body positioning in the context of ergonomics. The results showed that both tools significantly improved working posture and facilitated the procedure, with the microscope yielding slightly better outcomes compared to the loupe. Although both aids had a positive effect, their contribution from an ergonomic perspective was considered highly significant, emphasizing the potential of such technologies in preventing musculoskeletal disorders among dentists (24, 25).

A one-way analysis of variance revealed statistically significant differences in the frequency of musculoskeletal pain between different dental specialties. The highest frequency was observed among specialists in prosthodontics, pediatric dentistry, orthodontics, and endodontics, whereas lower values were noted among oral surgeons, general dental practitioners, and periodontists. These findings confirm that specialties requiring prolonged static postures, high precision, and repetitive movements are at greater risk of developing musculoskeletal disorders (Tables 4, 5) (26–29).

Data from Croatia provide additional insight into the health status of practicing dentists. The results of a survey conducted among 506 dentists revealed concerning figures: 78.18% of respondents reported pain in the upper back, while 76.97% experienced lower back pain. Skin problems were reported by 29.29% of participants, vision issues by 46.87%, and hearing problems by 19.03%. Neurological disorders were reported by 15.76% of dentists. This study represents the first detailed investigation in Croatia of dentists' health status, with the high prevalence of problems largely associated with limited workplace ergonomics, numerous potential occupational risk factors, and inadequate professional equipment. The findings highlight an urgent need to improve ergonomic standards and provide education on proper posture in dental practice (30, 31, 32).

Although more than half of our participants reported performing muscle stretching exercises during the workday, a very small number had attended continuous training or courses in ergonomics. This finding is particularly significant, as it indicates a systemic lack of formal education despite the high prevalence of musculoskeletal complaints. Similar results have been observed in other studies, demonstrating that informal knowledge and personal experience cannot fully replace structured ergonomics training (31).

In our study, continuous education in ergonomics did not show a statistically significant association with the occurrence of musculoskeletal pain. This finding can be partly explained by the very small number of participants who had the opportunity to attend such training, indicating a systemic lack of formal education in this area. In contrast, physical activity proved to be a significant protective factor: participants who exercised regularly reported a substantially lower frequency of musculoskeletal complaints, supporting previous evidence on the preventive role of movement and targeted exercises in reducing the risk of work-related musculoskeletal disorders (WMSDs).

Particularly interesting data come from the population of dental students. In one survey, knowledge of ergonomics was assessed before and after training. Before the lecture, students demonstrated very limited understanding of basic ergonomic principles, whereas after the training they correctly answered 88% of the questions. These results clearly emphasize the importance of formally integrating ergonomic principles into educational curricula, as proper knowledge of ergonomic standards at an early stage of training can reduce the long-term risk of developing WMSDs (32).

A similar issue was investigated by Muthuraj and colleagues, who conducted an experimental study analyzing the posture of students during supragingival calculus removal using the standard photometric assessment method (SPAM). The study included 90 students, and their posture during the procedure was photographed and subsequently analyzed. The results showed that the majority of students practiced inadequate posture, significantly increasing the risk of developing work-related musculoskeletal disorders. These findings further underscore the importance of practical ergonomics in everyday dental education, as well as the need for continuous monitoring and correction of working habits in the early stages of a professional career (33).

CONCLUSIONS

1. Musculoskeletal pain occurs relatively early in dentists' careers, already after slightly more than one year of professional practice, and is common within the professional population. These findings indicate that such disorders are not solely the result of long-term work experience, but are associated with working posture, repetitive movements, and static load.

2. The majority of participants work primarily in a seated position with occasional standing, yet do not use ergonomic chairs. There is a discrepancy between subjective assessment of posture and actual ergonomic conditions, suggesting insufficient awareness of ergonomic principles and adaptation to suboptimal working conditions.

3. The dental profession is perceived as highly stressful. Physical strain, combined with psychological demands and responsibility toward patients further increases the risk of occupational health issues.

4. Specialties requiring prolonged static postures and precise repetitive movements (prosthodontics, orthodontics, pediatric dentistry, endodontics) exhibit a significantly higher frequency of musculoskeletal pain.

5. Most dentists lack adequate protective equipment and formal WMSD prevention protocols, highlighting the need for institutional improvements and the implementation of standardized preventive measures.

6. Formal education on ergonomics and the use of technologies such as magnifying loupes and microscopes improve posture and reduce the risk of musculoskeletal disorders, emphasizing the importance of integrating ergonomic principles into both educational curricula and clinical practice.

Abbreviations

WMSDs - Work-related musculoskeletal disorders

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Sažetak

ERGONOMSKI RIZIK I MIŠIĆNO-SKELETNI BOL U STOMATOLOŠKOJ PRAKSI

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Uvod: Ergonomija u stomatološkoj praksi ima ključnu ulogu u očuvanju profesionalnog zdravlja, jer produženi statički položaji i ponavljajući pokreti značajno povećavaju rizik od profesionalnih mišićno-skeletnih oboljenja kod stomatoloških radnika. Razumevanje ergonomskih faktora rizika i njihovog uticaja na mišićno-skeletno zdravlje od suštinskog je značaja za identifikaciju rizičnih grupa i razvoj efikasnih preventivnih strategija u stomatološkoj praksi.

Cilj: Cilj ove studije bio je proceniti učestalost mišićno-skeletnog bola kao manifestacije profesionalnih mišićno-skeletnih oboljenja kod stomatologa te analizirati njegovu povezanost sa demografskim karakteristikama, radnim navikama i stomatološkom specijalizacijom.

Materijal i metode: Ova studija preseka obuhvatila je 130 stomatologa različitih specijalnosti. Podaci su prikupljeni putem strukturiranog upitnika koji je obuhvatio demografske varijable, radne navike, ergonomijske uslove i prisustvo mišićno-skeletnog bola. Primenjene su deskriptivne statističke metode, a hi-kvadrat test korišten je za analizu povezanosti između kategorijskih varijabli, uz nivo statističke značajnosti $p < 0,05$.

Rezultati: Rezultati su pokazali da je većina ispitanika imala profesionalna mišićno-skeletna oboljenja, pri čemu je prevalencija rasla sa starošću i dužinom radnog staža. Profesionalni faktori poput produženog sedenja ili stajanja, nepravilnog radnog položaja, nedostatka ergonomskih stolica i nedovoljne fizičke aktivnosti bili su značajno povezani s pojavom profesionalnih mišićno-skeletnih oboljenja ($p < 0,05$). Takođe je uočena statistički značajna povezanost između stomatološke specijalizacije i prisustva profesionalnih mišićno-skeletnih oboljenja ($\chi^2(9) = 25,83$; $p < 0,01$). Najveća prevalence zabeležena je kod specijalista protetike, dečije stomatologije, ortodoncije i endodoncije, dok je niža prevalence uočena kod oralnih hirurga, doktora opšte stomatologije i parodontologa.

Zaključak: Ovi nalazi naglašavaju značaj implementacije ergonomskih intervencija, redovne fizičke aktivnosti i preventivnih strategija u stomatološkoj praksi radi smanjenja profesionalnog rizika od mišićno-skeletnih oboljenja.

Ključne reči: ergonomija, stomatologija, WMSDs, mišićno-skeletni bol, profesionalni rizik, specijalizacija.

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