

Musculoskeletal Disorders among Dental Surgeons in Bangladesh: The Role of Ergonomic Knowledge and Psychosocial Stress

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ABSTRACT

Background: Musculoskeletal disorders (MSDs) are a major occupational health concern among dental professionals due to prolonged static postures and repetitive movements. In addition to ergonomic factors, psychosocial stress may contribute to the development of MSDs. This study aimed to assess the prevalence of MSDs among dental surgeons in Bangladesh and to examine the role of ergonomic knowledge and psychosocial stress.

Methods: A cross-sectional study was conducted among 290 dental surgeons working in public and private tertiary-level hospitals. Data were collected using a structured interview-administered questionnaire, including the Standardized Nordic Musculoskeletal Questionnaire for MSDs assessment, a validated tool for ergonomic knowledge, and a psychosocial stress questionnaire. Descriptive statistics were used to summarize data, and Chi-square tests were applied to assess associations, with significance set at $p < 0.05$.

Results: Overall, 64.1% of participants reported experiencing MSDs in at least one body region during the past 12 months. The most commonly affected regions were the neck (61.5%), lower back (53.7%), and shoulders (51.9%). Most respondents (69.0%) had good ergonomic knowledge, while 49.3% experienced moderate level of psychosocial stress. No statistically significant association was found between ergonomic knowledge and MSDs ($p = 0.065$). However, psychosocial stress showed a strong and significant association with MSDs ($p < 0.001$), with higher prevalence observed among those with moderate to high stress levels.

Conclusion: MSDs are highly prevalent among dental surgeons in Bangladesh. While most practitioners possess good ergonomic knowledge, it was not significantly associated with MSD occurrence. In contrast, psychosocial stress emerged as a significant contributing factor. Comprehensive preventive strategies integrating both ergonomic training and stress management are essential to reduce the burden of MSDs among dental professionals.

KEYWORDS: *Musculoskeletal disorders; Dental surgeons; Ergonomic knowledge; Psychosocial stress; Occupational health; Ergonomics.*

INTRODUCTION

Musculoskeletal disorders (MSDs) are among the most common occupational health problems affecting workers worldwide and are considered a major cause of disability, absenteeism and reduced productivity. MSDs are characterized by pain, discomfort or functional impairment involving muscles, joints, tendons, ligaments and other supporting structures of the body. These disorders often develop gradually due to repetitive movements, prolonged static postures, excessive force and awkward body positions during work activities. [1] Dental professionals are particularly vulnerable to MSDs because of the specific nature of their clinical work. Dental procedures often require maintaining static and awkward postures for extended periods while performing highly precise tasks within a restricted working field. Continuous bending of the neck, prolonged sitting posture, repetitive hand and wrist movements and the use of vibrating instruments increase the biomechanical load on the musculoskeletal system. [2] As a result, dentists are considered one of the professional groups at high risk for developing work-related musculoskeletal disorders. Several studies conducted worldwide have reported a high prevalence of MSDs among dental practitioners, ranging from 60% to 90%. [3-5] In addition to physical and ergonomic factors, psychosocial factors have also been recognized as important contributors to work-related musculoskeletal disorders. Occupational stress, high workload, time pressure and limited job control may lead to increased muscle tension, fatigue and reduced recovery, which

may increase the risk of musculoskeletal pain. [6] Previous studies have demonstrated that psychosocial stress is significantly associated with the occurrence of MSDs among healthcare professionals, including dentists.[7] Ergonomic knowledge plays an important role in preventing work-related MSDs among dental professionals. In dental practice, ergonomic knowledge particularly refers to the understanding of optimal healthy working posture, proper patient positioning, appropriate use of instruments and maintaining neutral body alignment during clinical procedures. Proper application of ergonomic principles can help minimize musculoskeletal strain and reduce the risk of developing MSDs. [8] However, despite having knowledge of ergonomic principles, many dental professionals do not consistently apply these practices during their daily clinical work, which may contribute to the high prevalence of MSDs in this profession. In many developing countries, including Bangladesh, research focusing on MSDs among dental professionals is still limited. Furthermore, the relationship between ergonomic knowledge, psychosocial stress and MSDs among dental surgeons has not been extensively explored. Therefore, the present study aimed to assess the prevalence of MSDs among dental surgeons in Bangladesh and to evaluate the influence of ergonomic knowledge and psychosocial stress on their development.

MATERIALS AND METHODS

This cross-sectional study was conducted among 290 dental surgeons working in thirteen public and private tertiary level hospitals in Dhaka city. Dental surgeons having at least five years of clinical experience and working a minimum of 20 hours per week were included in the study, whereas those having a history of trauma, accident or systemic diseases affecting the musculoskeletal system were excluded. Ethical approval was obtained from the Institutional Ethical Committee of Bangladesh University of Professionals (BUP) with the reference number 24.786.51, and prior permission was taken from the respective hospital authorities. Informed written consent was obtained from each participant before data collection and the study was conducted in accordance with the Declaration of Helsinki. [9] Data were collected using a structured interview-administered questionnaire consisting of several sections including socio-demographic information, musculoskeletal symptoms, ergonomic knowledge and psychosocial stress assessment. MSDs were assessed using the Standardized Nordic Musculoskeletal Questionnaire (NMQ), which is a widely used and internationally validated screening tool designed to evaluate the presence of musculoskeletal symptoms in nine anatomical regions of the body during the previous 12 months and the last 7 days. The questionnaire also records whether these symptoms interfered with normal activities of the respondents. [10] In this study, ergonomic knowledge specifically refers to knowledge regarding optimal healthy sitting working posture during dental treatment. This knowledge was assessed using a questionnaire developed based on the document "Adopting a Healthy Sitting Working Posture during Patient Treatment", which is an integral part of ISO ergonomic guidelines for dental practice.[11] The questionnaire consisted of twelve multiple-choice questions evaluating the respondents' understanding of proper operator posture, patient positioning and ergonomic working principles during dental procedures. Each correct answer was assigned one point and incorrect answers received zero points. Based on the total score obtained, the level of ergonomic knowledge was categorized into

three groups: poor knowledge (0–4), average knowledge (5–8) and good knowledge (9–12). Psychosocial stress was assessed using a modified version of the Health Evaluation Questionnaire for Psychological Stress in the Healthcare Industry, which consists of seventeen questions related to work environment, workload, interpersonal relationships and job-related stress conditions.[12] The responses were recorded in a yes/no format and scored accordingly. Based on the total score, psychosocial stress levels were categorized as low stress, moderate stress and high stress. All collected data were checked for completeness and entered into the Statistical Package for Social Sciences (SPSS) version 22 for analysis. Descriptive statistics such as frequencies and percentages were used to summarize the characteristics of the study participants and the prevalence of musculoskeletal disorders. The association between ergonomic knowledge, psychosocial stress and musculoskeletal disorders was assessed using the Chi-square test, and statistical significance was considered at $p < 0.05$.

Table 1 : Prevalence and distribution of MSDs among dental surgeons (n = 290)

Body region	Frequency	Percentage (%)
Neck	178	61.5
Lower back	156	53.7
Shoulders	150	51.9
Hands/Wrists	113	38.9
Upper back	64	22.2
Knees	6	2.1
Ankles/Feet	5	1.9
Any one body region	186	64.1

*Multiple response

Table 1 shows overall, 64.0% of the dental surgeons reported experiencing MSDs in at least one body region during the previous 12 months. Neck pain was the most commonly reported musculoskeletal complaint (61.5%), followed by lower back pain (53.7%) and shoulder pain (51.9%).

Table 2 : Distribution of dental surgeons according to knowledge regarding optimal healthy posture and psychosocial stress

Variables	Category	n (%)
Knowledge regarding optimal healthy posture	Poor	12 (4.1)
	Average	78 (26.9)
	Good	200 (69.0)
Knowledge score:	Mean ($\pm$ SD): 9.1 $\pm$ 1.8, Range: 4 – 12	
Psychosocial stress	Low	129 (44.5)
	Moderate	143 (49.3)
	High	18 (6.2)
Psychosocial stress score:	Mean ($\pm$ SD): 11.0 $\pm$ 2.6, Range: 4 – 15	

Table 2 shows that the majority of respondents (69.0%) had good knowledge regarding optimal healthy posture, while 26.9% had average knowledge and only 4.1% had poor knowledge. Regarding psychosocial stress almost half (49.3 %) were in moderate stress, 44.5 %, 6.2 % were in low stress, high stress respectively.

Table 3 : Association between knowledge regarding optimal healthy posture and MSDs

Knowledge level	Without MSDs n (%)	With MSDs n (%)	p value
Poor	0 (0)	12 (6.5)	0.065
Average	8 (7.7)	70 (37.6)	
Good	96 (92.3)	104 (55.9)	

Table 3 shows that although the prevalence of MSDs was higher among respondents with poor or average knowledge regarding optimal healthy posture, the association was not statistically significant ($p > 0.05$).

Table 4 : Association between psychosocial stress and MSDs

Stress level	Without MSDs n (%)	With MSDs n (%)	p value
Low	79 (76.0)	50 (26.9)	<0.001
Moderate	19 (49.3)	124 (66.7)	
High	6 (5.8)	12 (6.5)	

Table 4 shows that psychosocial stress had a highly significant association with MSDs ($p < 0.01$).

DISCUSSION

This study revealed a considerable prevalence of MSDs among dental surgeons in Bangladesh, with ergonomic knowledge and psychosocial stress emerging as important associated factors. The findings of this study revealed that 64% of dental surgeons experienced MSDs in at least one body region during the previous 12 months, indicating a substantial occupational health burden among dental professionals. Similar high prevalence has been reported in several studies conducted in different countries. Gupta et al. reported a prevalence of 79% among dental professionals in India, while Saxena et al. found a prevalence of 83.1%. [13,14] Another study conducted by KiHun et al. reported that approximately 86.8% of dentists experienced musculoskeletal symptoms. [15] Regarding the distribution of musculoskeletal complaints, the present study found that neck pain was the most frequently reported symptom (61.5%), followed by lower back pain (53.7%) and shoulder pain (51.9%). These findings are consistent with previous studies which reported that the neck and lower back are the most commonly affected regions among dental professionals due to prolonged forward bending and static working posture. [16,17] The present study also assessed the level of knowledge regarding optimal healthy posture among dental surgeons. Although the majority of respondents demonstrated good ergonomic knowledge, no statistically significant association was observed between ergonomic knowledge and MSDs ($p = 0.065$). However, the p-value was close to the conventional threshold of statistical significance, suggesting a possible trend toward an association that may not have been fully captured in the present study. This finding indicates that while ergonomic knowledge alone may not directly prevent MSDs, it could still contribute to risk reduction when consistently translated into clinical practice. It is also possible that a larger sample size or assessment of actual ergonomic behavior rather than theoretical knowledge may better clarify this relationship. Similar findings have been reported in previous studies where dentists possessed adequate ergonomic knowledge but continued to experience a high prevalence of musculoskeletal pain due to inadequate implementation of ergonomic practices during routine clinical work. [18] In contrast, psychosocial stress showed a strong association with MSDs in this study. Dental surgeons

experiencing moderate or high levels of psychosocial stress were significantly more likely to report musculoskeletal symptoms compared with those with low stress levels. These findings are consistent with previous research which reported that occupational stress can contribute to muscle tension, fatigue and increased risk of musculoskeletal pain. [19] KiHun et al. also reported that occupational stress was significantly associated with increased musculoskeletal symptoms among dental practitioners. [15] Therefore, the findings of the present study indicate that psychosocial factors play an important role in the development of MSDs among dental professionals. Effective preventive strategies should include not only ergonomic education but also measures to reduce occupational stress and improve working conditions. In practical clinical settings, comprehensive preventive strategies may include regular ergonomic training workshops, reinforcement of correct operator and patient positioning, scheduled short breaks between procedures, stretching exercises during working hours, use of ergonomically designed instruments and adjustable dental chairs, workload management, and workplace stress reduction initiatives such as peer support, time management, and mental health awareness programs. These approaches may help reduce biomechanical strain, improve recovery, and minimize the long-term burden of MSDs among dental professionals.

LIMITATIONS

This study has certain limitations. As a cross-sectional study, causal relationships between ergonomic knowledge, psychosocial stress, and MSDs cannot be established. In addition, data were collected through self-reported questionnaires, which may be subject to recall and reporting bias. Despite these limitations, the study provides useful evidence regarding MSDs among dental surgeons in Bangladesh.

CONCLUSION

MSDs were found to be highly prevalent among dental surgeons. Although most participants demonstrated good knowledge of optimal healthy posture, this knowledge alone was not significantly associated with the occurrence of MSDs. In contrast, psychosocial stress showed a strong association with MSDs. These findings suggest that knowledge alone is insufficient and highlight the need for comprehensive preventive strategies incorporating both ergonomic training and stress management to reduce the burden of MSDs among dental professionals. Such strategies may include routine ergonomic skill reinforcement, proper posture monitoring during clinical procedures, scheduled rest breaks, ergonomic workplace modifications, and interventions aimed at reducing occupational stress and improving psychosocial well-being.

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CONFLICT OF INTEREST: The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT: The data presented in this study are available on reasonable request from the corresponding author

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