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THE DENTAL ERGONOMIC ENIGMA: A CROSS-SECTIONAL INSIGHT INTO DENTAL PRACTICE IN PAKISTAN

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Abstract

Background:
Dentistry is a strenuous job involving sitting in the same position, using hands constantly and eyes focused. These work conditions make one vulnerable to musculoskeletal disorders (WMSDs), the neck, shoulders, and lower back. Affecting clinical performance and long term wellbeing of dentists.

Objectives:
To determine the knowledge, attitudes, and practices concerning dental ergonomics, to establish the prevalence of musculoskeletal discomfort in Pakistani dental professionals of various clinical settings.

Methods:
A cross-sectional observational study, which involved a structured self-administered online questionnaire with 29 items determined the demographic factors, awareness of ergonomics, clinical practice, and work-related musculoskeletal symptoms.
203 participants, including house officers, general dentists, postgraduate trainees, and consultants from private and public institutions.

Results:
203 respondents 74.1% female majority aged 20-25 years and 28.6% males aged 20-25 years. Musculoskeletal complaints lower back and neck/shoulder pain were the most frequently reported, whereas the wrist and hand discomfort were relatively low .
Majority of the respondents show good knowledge of the ergonomic principles, and only about 30% had received formal ergonomics training.

Conclusion:
The article indicates that dental practitioners in Pakistan have a high rate of work-related musculoskeletal pain due to moderate levels of ergonomics awareness. Lack of adequate training leads to bad ergonomic practice hence training

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programs and workshops should be encouraged to enhance workplace ergonomics, which can help promote a healthier and more sustainable dental workforce.

INTRODUCTION

The work of dentistry is physically demanding and needs lots of concentration hard work and ability to remain in one position at the expense of long time. Dental practitioners tend to operate under small spaces, which in most cases is very physical tension due to awkward body positions, repetition of hand motions and absence of a time to rest or have a break. Such conditions have led to high prevalence of work related musculoskeletal disorders (WMSDs) in dentists around the world in parts of neck, shoulders, back, and wrists [1] WMSDs can impair the physical functions and diminish the clinical productiveness, negatively affecting patient care, and causing an early retirement unless controlled effectively [2,3]. Studies conducted in most countries have indicated that WMSDs are prevalent among dentists with an average prevalence rate of between 64-90 percent with upper extremities, lumbar and cervical sides being the most affected parts [4,5]. Over the past few years, musculoskeletal disorder (MSD) in dental practitioners, has been rampant and very well reported in Pakistan. A Karachi based study showed that two-thirds (75.8) of the dentists had reported musculoskeletal discomfort in their lower back and shoulders as a result of the long hours in the clinic and absence of ergonomic measures [6]. On the same note, according to research carried out in the teaching hospitals of Islamabad and Rawalpindi, there was a high prevalence of WMSDs in dentists (91.5% prevalence) with longer immobile postures and poor ergonomic practices cited as some of the factors that predisposes the dentist to develop WMSDs [7].Related findings were documented in Peshawar as Ali R reported high prevalence of musculoskeletal disorder among dentists and increased risk of developing WMSDs among female dentists and senior academic staff [9] Nonetheless, regardless of these rising challenges, the level of awareness regarding ergonomics in dental profession in Pakistan is very low. A survey of house officers and final year dental students in Karachi revealed that over fifty percent were not taught about ergonomics formally and were not aware of how to rectify the posture [10]. A study, which was conducted at the University of Lahore, found that shoulder pain and wrist pain occurred in many dental students and interns because of their poor posture and their inability to use micro breaks or stretches in their daily lives [11]. Worryingly, even the participants who were aware of good ergonomic behaviour responded with low compliance implying that there is a big gap between awareness and behaviour that should be dealt with at all costs [10,11].

Biomechanical, organizational and psychosocial factors are among the reasons that lead to the development of work-related musculoskeletal disorders (WMSDs) among dental professionals. The main biomechanical strains include long term neck flexion, rotated trunks, elevated arms and immobility. Moreover, excess workloads, lack of light and

ill-adapted equipment lead to fatigue and repetitive strain injuries [12]. Most of the dental practices in the low and middle income countries such as Pakistan are poorly organized in the placement of operator and patient and there is little investment in the ergonomic equipment like adjustable chairs, magnification equipment or appropriate light systems [6,8,1 2]. Along these lines, the lack of institutional policies or clinical guidelines, which promote the principle of ergonomic best practices, is prevalent in most public and private dental organizations as a follow-up, the gap in the research of ergonomic awareness levels, its practical implementation and prevalence of work related musculoskeletal disorders (WMSDs) among the various categories of dental professionals is an urgent necessity. Although there are several past studies that investigated those issues separately or at some specific geographical areas, very few ones have investigated them in systematic ways which takes into account demographic aspects (e.g., age, gender and work experience), working conditions, patterns of behaviour and health consequences. The current research will address this gap by conducting an

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extensive cross sectional research on dental ergonomics in Pakistan and among house officers, postgraduate trainees and
consultants, general dentists and surrounding undergraduate students in various clinical settings through knowledge measurement, occupational health attitudes and behaviours in ergonomics and workplace prevalence and distribution of work related musculoskeletal disorders (WMSDs) the purpose of this study will be to shed light on the present state of the occupation health in the dental profession in Pakistan.

The outcomes will help it to identify critical areas that need the intervention be it change in curriculum, training of the faculty, infrastructure enhancement or formulation of policies. Judging by the evidence gained in the course of the examination of the national and international studies it can be stated that the issue of the enhanced ergonomic practices is not only the issue of the professional health but it is a matter of the national health that influences not only the sustainability of the workforce but also the quality of healthcare

MATERIALS AND METHOD

A cross-sectional observational study was conducted to systematically assess awareness attitudes and challenges regarding ergonomics in dentistry across Pakistan. Which included house officers working in different public and private hospital setups, trained general dentists working in their own private practices, consultants, and postgraduate trainees.

Data were collected via google form a online questionnaire consisting of 29 questions assessing demographics, knowledge, and frequent challenges faced in routine.

The questionnaire was circulated digitally to gather responses from participants.

Primary outcomes aimed to identify best practices, common musculoskeletal disorders, and areas for improvement. In total, six questions were designed to collect demographic information while knowledge gap awareness, and practice were assessed through 19 questions focusing on ergonomics in routine dental treatment.

Attitudinal aspects were evaluated using items related to the perceived need for incorporating ergonomics into the dental curriculum, adherence to ergonomic principles in practice, the role of dental chairs and Instruments in maintaining ergonomics, the importance of alternating between sitting and Standing during procedures and the necessity of dental education Programs on ergonomics knowledge, attitude, and practice were assessed using a combination of dichotomous (Yes/No) items and a five point Likert scale (Always, Often, Sometimes, Rarely, Never) [13]

The practice related questions specifically explored behaviour's such as the frequency of working in an upright posture and maintaining a neutral position during clinical procedures data collected through a web based

Self-administered questionnaire, which included different questions. The questionnaire was made by searching literature and compilation of items from previous research papers [14]

A cross sectional survey conducted having a sample size of 203, which was calculated using the WHO calculator in which confidence level was 95% with 7% margin of error including both female and male dentists in pakistan collected questionnaires were systematically coded and compiled, then transferred to microsoft excel for data organization. The data was subsequently exported to statistical package for social sciences (SPSS) version 27.0 for comprehensive analysis.

The research undertakes to investigate the challenges of implementing ergonomic practices in dentistry, with the goal of shaping guidelines for dental professionals. Results were interpreted to identify prevalent Musculoskeletal disorders, best practices, and barriers to the analysis aimed to provide evidence based recommendations for improving ergonomic practices, thereby contributing to enhanced occupational health and patient care in dentistry.

RESULTS

Total of 203 dental practitioners from multiple cities d in this study. The respondent's primarily consisted of females (71.4%) and males (28.6%) belonged to the age group 20-25 years (71.4%) followed by 26-30 years (22.2 %).Most

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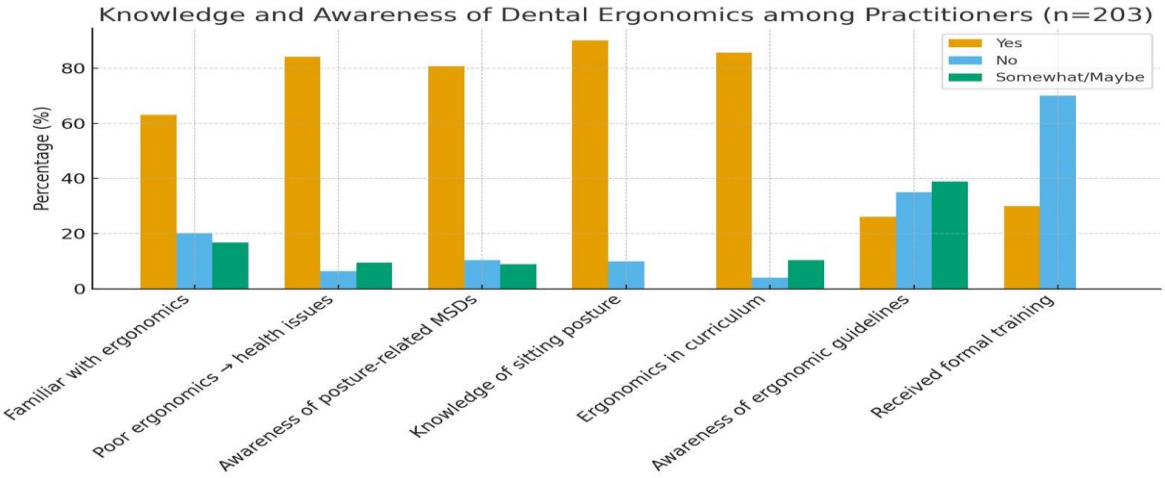
participants were Dental Students (59.6%) followed by General Dentists (23.6%) and the rest of ppercentage's comprised of House officers, Consultants and PGs Trainee. 62.1% dental practitioners worked in Hospital settings while 19.2% in private clinics and 18.7% worked in both. Total of 203 dental practitioners from multiple cities across Pakistan participated in this study. The respondents primarily consisted of females (71.4%) and males (28.6%) with dominant age group was 20-25 years (71.4%) followed by 26-30 years (22.2 %).

Most participants were Dental Students (59.6%) followed by General Dentists (23.6%) and the remaining participants comprised of House officers, Consultants and PGs Trainee. 62.1% dental practitioners worked in Hospital settings while 19.2% in private clinics and 18.7% worked in both.

Musculoskeletal Pain in different Body parts of Dental practitioners shows that almost equal portion suffers with both Back and Neck/Shoulders pain whereas only minor pproportion deals with Hands/Wrist problems.

FIGURE 2- (Bar Chart): Knowledge and Awareness of Dental ergonomics in Dental Practitioners.



Most participants showed satisfactory level of awareness regarding dental ergonomics, with the majority recognizing its importance and knowing correct sitting posture. However, only 30% had received formal ergonomic training, and less than one-third were aware of established ergonomic guidelines.

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TABLE 1-Ergonomics Principles in daily work.

Variable	Category	Frequency	Percentage
Application of ergonomic principles	Sometimes	65	32.0%
Workplace supports ergonomics	Partially	118	58.1%
Maintain back support while treating patients	Often	76	37.4%
Adjust position according to patient	Sometimes	87	42.9%
Take breaks between procedures	Sometimes	76	37.4%
Perform stretching/microbreaks	Occasionally	72	27.1%
Awareness of recommended exercises	Aware but don't practice	72	21.2%
Use indirect vision (mirror technique)	Often	86	29.1%
Work with dental assistant	Often	56	16.7%
Instruments within comfortable reach	Sometimes	88	43.3%
Use of ergonomic tools	Aware but not using	64	31.5%

TABLE 1 shows that many practitioners showed moderate level awareness of ergonomic practices but lacked in implementation. Many lacked regular stretching or breaks, and suffered with limited access to ergonomic tools or supportive workplace environment.

major portion of Practitioners face challenges in their daily practice (49% frequently , 30% occasionally) with musculoskeletal discomfort

DISCUSSION

Our findings are consistent with this previous literature (15), which reported strong awareness of ergonomics among dental practitioners. However, while their participants demonstrated more consistent application of ergonomic principles, our study revealed poorer implementation, largely due to limited training and workplace support. It also emphasized the importance of posture and ergonomic design which supports our observation. Similarly, the systematic review in this article [16]emphasized the effectiveness of ergonomic interventions in reducing musculoskeletal disorders, contrasting with our findings where such interventions were infrequently practiced in Pakistan's dental OPDs and clinic setups.

This international publication [17] reported higher awareness of ergonomic guidelines among Saudi dental professionals compared to our participants, indicating possible regional differences in curriculum integration and implementation of ergonomic principles.

Similar patterns have been reported in Pakistan, A previous research study[18]also reported a high prevalence of musculoskeletal disorders among Pakistani dentists, with evidence of pain in the back and neck/shoulders as seen in our study. This study also [19] observed average knowledge of ergonomics but poor practical implication of it among dental professionals working in Pakistan which is consistent with our findings limitation of this research is that it is questionnaire based due to which knowledge and practice of ergonomics may not be best assessed by this method. It is also highlighted in the previous literature [20]. Another limitation of this study is the sample size which should have been more than 203 in order to get more accurate results. Different exercises can be used to prevent the muscular problems faced by dentists such as stretching exercises and aerobic exercises.

This study confirms that musculoskeletal disorders are a major occupational hazard for dental professionals, with awareness of ergonomics often surpassing its actual practice. In Pakistan, restricted training opportunities, lack of workplace support, and weak understanding of guidelines affect these professionals.

In conclusion, this study shows a significant presence of musculoskeletal disorder/discomfort among dental professionals in Pakistan, especially among young dental practitioners. These findings shows a clear gap in ergonomic awareness and its application, emphasizing the need for comprehensive change in dental training and workplace practices to protect the long term health and efficiency of professionals.

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These challenges remain prominent. By making ergonomic education part of dental curriculum, improving workplace arrangement, supporting regular workshops and awareness programs may help bridge the gap between knowledge and practice. Future research should look at the long term results of ergonomic interventions and search for tools such as posture monitoring devices to help create a healthier and more sustainable work environment for dental professionals.

CONCLUSION

The study identifies the effect of musculoskeletal disorders among dental professionals in pakistan most frequently affecting back ,neck, shoulder and wrist though most participants showed a satisfactory level of awareness regarding dental ergonomics but, ergonomics implication was limited in daily routine contributing factors included inadequate formal training.

Use of ergonomic tools, working with dental assistance, lack of regular stretching breaks, and not implementing on recommended exercises contribute to this gap.

Inadequate ergonomic practice adversely affects quality of care and professional Iongevity thus incorporation of ergonomics into the dental curriculum is essential. Training programs of and workshops should be encouraged enhancing workplace ergonomics can help promote healthier and more sustainable dental workforce.

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