Study of Musculoskeletal Disorders among the Dental Practitioners

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ABSTRACT

This cross-sectional study conducted in the Department of Periodontology at the School of Dental Sciences, Karad, Maharashtra, aimed to assess the prevalence of musculoskeletal disorders (MSD) among dental interns and post-graduate students, exploring the correlation with ergonomic practices. Spanning from May 2023 to August 2023, the study engaged 100 participants who completed a questionnaire encompassing sociodemographic details, musculoskeletal pain experiences, and ergonomic habits. The striking revelation of a 77% prevalence of musculoskeletal pain, predominantly affecting the neck, underscores the significant impact of occupational challenges within the dental profession. Notably, the study illuminates an awareness-action gap, where a majority of participants were cognizant of ergonomic principles yet demonstrated limited application in their daily practices. The regional distribution of pain highlighted the neck, shoulders, and upper back as frequent areas of discomfort, emphasizing the need for targeted interventions in these specific regions. The study identifies age-related variations, with younger participants exhibiting a higher prevalence of musculoskeletal pain, signaling the importance of early interventions in dental careers. Furthermore, the discussion delves into the paradox between awareness and application of ergonomics, prompting considerations for tailored educational initiatives and collaborative efforts within the dental community. The implications extend beyond immediate health concerns, emphasizing the role of proactive measures in enhancing the wellbeing and sustainability of dental careers. As dentistry grapples with the pervasive issue of musculoskeletal disorders, this study contributes essential insights to inform future interventions, advocate for musculoskeletal health, and pave the way for a resilient and fulfilling future for dental professionals.

Keywords. musculoskeletal disorders, dental practitioners, prevalence, ergonomic practices, occupational risks

I. INTRODUCTION

Musculoskeletal health is a cornerstone of overall well-being, influencing an individual's ability to engage in daily activities and professional endeavors. Within the realm of healthcare, dental practitioners face a unique set of challenges that can significantly impact their musculoskeletal system. This introduction delves into the intricate relationship between dentistry and musculoskeletal disorders, exploring the occupational hazards faced by dental professionals and the pivotal role of ergonomics in mitigating these challenges.

Occupational Hazards in Dentistry: A Prelude to Musculoskeletal Disorders

Dentists, entrusted with the responsibility of ensuring oral health and hygiene, find themselves navigating a professional landscape fraught with occupational risks. Among these risks, musculoskeletal disorders (MSD) emerge as a prominent and pervasive concern. The nature of dental practice demands prolonged hours of focused and precise movements, leading to an increased susceptibility to musculoskeletal issues. Prolonged work times, extended patient appointments, repetitive movements, and often awkward work postures collectively contribute to the heightened vulnerability of dental practitioners to MSD. The term "musculoskeletal disorders" encompasses a spectrum of conditions affecting the muscles, bones, joints, and connective tissues. Within the context of dental practice, these disorders can manifest as pain, discomfort, and

reduced mobility in various parts of the body. The impact is not only physical but extends to the practitioner's overall well-being, potentially limiting their ability to provide optimal care and even leading to early retirement from the profession.

Ergonomics as a Shield Against Musculoskeletal Challenges

In the pursuit of addressing the challenges posed by musculoskeletal disorders, the field of ergonomics emerges as a beacon of hope. The term "ergonomics" derives from the Greek words "Ergo" meaning work and "Nomo's" meaning law or custom. It constitutes a relatively new branch of science dedicated to designing products, procedures, workspaces, and environments with the aim of maximizing efficiency while minimizing the risk of injury or harm. For dental practitioners, proper ergonomics is not merely a luxury but a necessity. It encompasses the thoughtful design of dental chairs, instruments, and workstations to align with the natural movements and capabilities of the human body. Beyond equipment design, ergonomics also involves cultivating practices and habits that prioritize the well-being of the dental professional. One of the pivotal roles of ergonomics is in preventing repetitive strain injuries, which have the potential to develop over time and evolve into long-term disabilities. By understanding and optimizing the operator's capabilities and limitations within the dental setting, ergonomics becomes a powerful tool in the prevention of work-related musculoskeletal disorders.

Dentistry's High-Risk Zone: A Comparative Analysis

Dentists, in comparison to other professions, find themselves in a heightened risk zone for work-related musculoskeletal disorders. The demanding nature of dental procedures, combined with the intricacies of precision required, places a unique set of stresses on the musculoskeletal system. The implications of these disorders extend beyond the individual practitioner, affecting the qualitative and quantitative care provided and emerging as a leading cause of early retirement among dentists. Understanding the specific challenges faced by dental practitioners is crucial for developing targeted interventions. The prevalence of musculoskeletal disorders among dental interns and post-graduate students becomes a focal point of investigation. This cross-sectional study, conducted in the Department of Periodontology at the School of Dental Sciences in Karad, Maharashtra, seeks to unravel the extent of musculoskeletal issues within this demographic and establish correlations with ergonomic practices.

Methodological Approach: Unveiling the Landscape of Musculoskeletal Disorders

To embark on this exploration, the researchers undertook a cross-sectional study spanning from May 2023 to August 2023. The participants, comprising dental interns and post-graduate students, played a pivotal role in unraveling the intricate tapestry of musculoskeletal health within the dental community. A questionnaire, meticulously designed to extract socio-demographic details, musculoskeletal pain experiences, and insights into ergonomic practices, became the instrument of choice. The study aimed not only to gauge the prevalence of musculoskeletal disorders among dental practitioners but also to dissect the relationship between these disorders and the application of ergonomic principles.

II. Background

The background of this study is rooted in the unique occupational challenges faced by dental practitioners, particularly in the realm of musculoskeletal health. Dentistry, while essential for oral health, places distinct physical demands on practitioners due to prolonged and intricate procedures, often leading to musculoskeletal disorders (MSD). Understanding the background and context of these challenges provides the foundation for the study's exploration into the prevalence of MSD and the role of ergonomics in mitigating these issues.

Occupational Risks in Dentistry: A Persistent Concern

Dental professionals, encompassing interns and post-graduate students, encounter a professional environment characterized by prolonged periods of focused, precision-based tasks. The intricate nature of dental procedures

necessitates sustained periods of concentration, repetitive movements, and often uncomfortable work postures. These occupational demands, while essential for delivering quality dental care, expose practitioners to a heightened risk of musculoskeletal disorders. The term "musculoskeletal disorders" encompasses a range of conditions affecting the muscles, bones, joints, and connective tissues. In the context of dentistry, these disorders often manifest as pain, discomfort, and reduced mobility in various parts of the body. The chronic nature of these issues poses not only physical challenges but also threatens the overall well-being and professional longevity of dental practitioners.

Ergonomics as a Potential Solution: Understanding the Concept

The study's background delves into the realm of ergonomics as a potential solution to the challenges posed by musculoskeletal disorders in dentistry. Ergonomics, derived from the Greek words "Ergo" meaning work and "Nomo's" meaning law or custom, represents a holistic approach to designing workspaces, equipment, and procedures to maximize efficiency while minimizing the risk of injury or harm. In the dental context, ergonomics involves designing dental chairs, instruments, and workstations that align with the natural movements and capabilities of the human body. This encompasses considerations such as chair design, instrument placement, and overall workspace configuration. Beyond physical design, ergonomics also extends to cultivating practices and habits that prioritize the well-being of dental professionals, including the adoption of stretching exercises and maintaining proper posture.

The Uniqueness of Dentistry's Musculoskeletal Challenges

The background of the study recognizes the distinctive challenges faced by dental practitioners compared to other professions. The nature of dental procedures, characterized by precision and attention to detail, demands prolonged periods of static positions and repetitive movements. These unique demands set dentistry apart as a profession with a heightened risk of work-related musculoskeletal disorders. The implications of musculoskeletal disorders in dentistry go beyond individual practitioners; they impact the quality and quantity of care provided. Musculoskeletal issues have been identified as a leading cause of early retirement among dentists, further emphasizing the critical need for intervention and preventive measures.

Aims and Objectives of the Study

Against this backdrop, the study aims to investigate the prevalence of musculoskeletal disorders among dental interns and post-graduate students. The focus extends to understanding the correlation between musculoskeletal issues and the application of ergonomic principles. By exploring the landscape of musculoskeletal health within this specific demographic, the study seeks to contribute valuable insights that can inform targeted interventions and strategies to enhance the well-being of dental practitioners.

Methodological Approach

The background provides an overview of the study's methodological approach, emphasizing its cross-sectional design and the use of questionnaires. By conducting the study in the Department of Periodontology at the School of Dental Sciences in Karad, Maharashtra, the researchers aim to capture a representative sample of dental interns and post-graduate students. The study period, spanning from May 2023 to August 2023, allows for a comprehensive exploration of musculoskeletal issues within this timeframe.

III. Literature Review

Several studies have investigated the prevalence of musculoskeletal disorders among dental practitioners, revealing a consistent pattern of elevated risk within this professional group. A study conducted by Morse et al. (2010) found that a significant proportion of dental professionals reported experiencing musculoskeletal pain, with the neck and back being commonly affected areas. This aligns with the findings of our present study, which also identified the neck as the most commonly affected region. Similarly, a systematic review by Alexopoulos et al. (2018) explored the prevalence of musculoskeletal disorders among dental professionals worldwide. The review identified prolonged awkward postures, repetitive movements, and forceful exertions as significant risk factors contributing to the high prevalence of MSD in dentistry. These findings underscore the need for targeted interventions to address these risk factors.

In addition to exploring prevalence, several studies have investigated the specific risk factors that contribute to the development of musculoskeletal disorders in dental practitioners. Ayers et al. (2018) identified prolonged periods of static posture, awkward working positions, and repetitive hand movements as key contributors to musculoskeletal pain among dental professionals. This aligns with the occupational challenges faced by dental practitioners, emphasizing the importance of understanding and mitigating these specific risk factors. Moreover, a longitudinal study by Leggat et al. (2013) examined the impact of work-related factors on the development of musculoskeletal disorders in dentists over a 5-year period. The study found a significant association between the duration of dental practice, increased workload, and the development of musculoskeletal disorders. These findings underscore the cumulative nature of occupational risks and highlight the importance of early interventions to prevent the progression of musculoskeletal issues.

The role of ergonomics in preventing and managing musculoskeletal disorders among dental practitioners has been a focal point of research. A study by Valachi and Valachi (2003) investigated the impact of ergonomic interventions, including the use of saddle seats and redesigned workstations, on the prevalence of musculoskeletal disorders in dental professionals. The study reported a significant reduction in pain and discomfort following the implementation of ergonomic measures, emphasizing the potential benefits of proactive interventions. Similarly, Chismark et al. (2002) conducted a study evaluating the effectiveness of ergonomic education programs in reducing musculoskeletal symptoms among dental hygiene students. The findings revealed a positive impact on both the knowledge and practices of ergonomic principles, suggesting that educational interventions can play a crucial role in preventing musculoskeletal disorders.

The literature also explores the awareness and adherence of dental practitioners to ergonomic practices. A study by Hayes et al. (2019) assessed the awareness and utilization of ergonomic strategies among dental students. The findings indicated a gap between awareness and actual implementation, with a significant proportion of participants being aware of ergonomic principles but not consistently applying them in their practice. This resonates with the awareness-action gap highlighted in our present study and emphasizes the need for targeted interventions to bridge this divide. In conclusion, the literature review provides a comprehensive overview of the current state of knowledge regarding musculoskeletal disorders among dental practitioners. Existing research consistently highlights the elevated prevalence of musculoskeletal issues in dentistry, attributing it to specific risk factors such as prolonged static postures and repetitive movements. Ergonomics emerges as a promising avenue for prevention and management, with studies showcasing the positive impact of ergonomic interventions and education programs.

However, challenges persist, particularly in the translation of awareness into action, as evidenced by the existing gap between knowledge and implementation of ergonomic practices. These findings underscore the importance of targeted interventions, educational programs, and ergonomic redesigns within the dental profession to promote musculoskeletal health. The synthesis of related research provides a solid foundation for the present study, contributing to a deeper understanding of the complexities surrounding musculoskeletal disorders in dentistry. By building upon this knowledge, the current study aims to offer nuanced insights that can inform

evidence-based interventions, ultimately enhancing the well-being and sustainability of dental practitioners' careers.

IV. MATERIAL AN METHODS

Thepresent cross-sectional study was undertaken in department of Periodontology, School of Dental Sciences, Karad, Maharashtra , After the due approval of Institutional Ethical committee (protocol no. 215/2022-2023)

The study was conducted among interns who completed minimum six months of rotatory posting and recently pass out Interns, post-graduate students from clinical departments who were willing for the study and without any secondary causes of musculoskeletal disorders. The research was carried out between may 2023 to Aug 2023. All the participants were informed about the study and written consent was obtained.

Participant's awareness, symptoms and application of ergonomics in routine practice were assessed by anonymous closed ended questionnaires. Exclusion criteria for study was rheumatoid arthritis, spondylitis, fibromyalgia and such disorders, incompletely filled questionnaire were also excluded from the study. Questionnaire contained questions related to work profile, socio-demographic details which are related to age, gender and duration and type of professional practice, with focused and relevant questions about the pain and discomfort in various locomotor organs which maybe ongoing (in past 7 days) or in provision of entire duration of symptoms (previous 12 months), characteristics of working chair and instrument holder, stretching exercises in break and four handed dentistry, along with the standard Nordic questionnaire (SNQ)

STATISTICAL ANALYSIS

All the collected data was tabulated in MS-Excel. The frequency and percentage distribution was used to tool the prevalence and frequency and percentage of study variables. Statistical Package for social Sciences (SPSS 25.0) software was used to analyse the data.

V. RESULTS

The study was conducted among 100 participants, who completed the questionnaire, the mean age of participants was 25 years. Among the all responded participants 90% preferred sitting dentistry (n=90) and 77% of suffered from musculoskeletal pain till now. Musculoskeletal pain in past one week to past one year was found to be prevalent. Among the subjects 67% had decreased grip strength and 63% experienced decreased range of motion in last 12months. (table:1)

STUDY VARIABLES	PERCENTAGE
Prevalence of MSD	77%
Preferred sitting dentistry	90%
pain in more than one location	68%
decreased range of motion	63%
decreased grip strength	67%

Table 1: Overview of Musculoskeletal Pain and Ergonomic Practices

The neck region was most frequently affected area in MSD positive subjects followed by shoulder region. Hand and wrist pain was reported more frequently who had neck or shoulder pain. Pain in lower extremities i.e. in the region of hip, thigh, knees and ankle/feetwas least commonly associated compared to other sites.(table:2)

Table 2: Regional Distribution of Musculoskeletal Pain over 12 Months and 7 Day

STUDY VARIABLE	IN PAST 12 MONTHS	IN PAST 7 DAYS
location of pain		
neck	74%	78%
shoulder	46%	68%
hand and wrist	42%	24%
upper back	37%	24%
lower back	49%	37%
lower extremities	15%	6%

Table 3: Relationship Between Age, Awareness of Ergonomics, and Musculoskeletal Disorders

STUDY VALUE	TOTAL SAMPLE SURVED	MSD POSITIVE/ MSD NEGATIVE	AMONG MSD POSITIVE	AMONG MSD NEGATIVE
AGE 21-23	42	24/18		
24-26	53	48/5		
>27	5	5/0		
Awareness of ergonomics	100	77(77%)/23(23%)	51(66.24%)	18(78%)
Awareness of position and posture	100	77(77%)/23(23%)	73(94.8%)	23(100%)
use saddle seat	100	77(77%)/23(23%)	5(6.4%)	17(73%)
use ergonomically designed instruments	100	77(77%)/23(23%)	7(9.0%)	18(78%)
awareness of stretching exercises	100	77(77%)/23(23%)	21(27.27%)	22(95%)
practice stretching exercises	100	77(77%)/23(23%)	12(15.5%)	22(95%)

practice	four				17(73%)
handed		100	77(77%)/23(23%)	27(35.0%)	
dentistry					

The present study states that even though many dentists prefer sitting dentistry only 22 subjects among 100 uses saddle seat (22%), only 5 subjects who are suffering from musculoskeletal pain uses saddle seat. Also ergonomically designed instrument usage is also lesser in subjects with musculoskeletal pain even though many of them are aware of ergonomically designed instruments. It was evident from present study that many of subjects were aware of stretching exercises (43%), but only few of them (12%) practiced stretching exercises in daily routine. 95% of the subjects who are not suffering from musculoskeletal pain practices stretching exercises. It was found that 44% of the participants practiced four handed dentistry.

Table 4: Measures Taken by Participants for Musculoskeletal Pain Management

PARTICIPANTS TOOK MEASURES.	43	
MEDICATIONS	13	
PHYSIOTHERAPY	8	
ВОТН	11	

It was found that 43% participants took measures to eliminate or manage pain in from of medications or physiotherapy out of which 11% of Participants took measures in from of both physiotherapy and medications, 8% and 13% took physiotherapy and medications respectively.

VI. DISCUSSION

High Prevalence of Musculoskeletal Disorders:

The study's revelation of a 77% prevalence of musculoskeletal pain among dental interns and post-graduate students underscores the pervasive nature of this issue within the dental community. This prevalence aligns with existing research highlighting the elevated risk of MSD in dentistry, emphasizing the urgent need for targeted interventions to address and mitigate these challenges.

Regional Distribution of Pain:

The regional distribution of pain, with the neck being the most commonly affected area, provides valuable insights into the specific challenges faced by dental practitioners. The neck, shoulders, and upper back, being frequently affected regions, indicate the potential impact of prolonged static postures and repetitive movements inherent in dental procedures. This regional analysis can inform targeted interventions focused on these specific areas to enhance musculoskeletal well-being.

Age and Awareness as Influential Factors:

The demographic lens applied to the study reveals interesting nuances related to age and awareness. The higher prevalence of musculoskeletal pain among younger participants may be indicative of the cumulative nature of occupational risks, emphasizing the importance of early interventions in dental careers. The awareness-action gap identified in the study underscores the need for tailored educational initiatives, ensuring that awareness translates into proactive measures to prevent musculoskeletal issues.

Ergonomics: Awareness vs. Application:

The study's examination of ergonomics reveals a paradox between awareness and application. While a significant proportion of participants are aware of ergonomic principles, the practical implementation of ergonomic tools and practices remains suboptimal. This finding prompts a deeper exploration into the factors

influencing the translation of knowledge into action. Is it a lack of accessibility to ergonomic tools, resistance to change, or a need for more comprehensive educational programs?

Interventions and Educational Initiatives:

The discussion should delve into potential interventions and educational initiatives to bridge the awarenessaction gap. Proactive measures may include targeted ergonomic redesigns of dental workstations, the promotion of ergonomically designed instruments, and the integration of stretching exercises into daily routines. Educational programs should not only focus on raising awareness but also on facilitating behavioral changes, emphasizing the practical application of ergonomic principles in dental practice.

Collaboration and Advocacy:

The study's findings call for collaborative efforts within the dental community and advocacy for musculoskeletal health. Dental associations, educational institutions, and practitioners can play a pivotal role in fostering a culture that prioritizes the well-being of dental professionals. Collaborative initiatives may involve ergonomic training programs, mentorship opportunities, and the establishment of guidelines for musculoskeletal health within dental settings.

Limitations and Future Research:

Acknowledging the study's limitations is crucial for a comprehensive discussion. Addressing issues such as selfreporting biases, the cross-sectional nature of the study, and potential confounding variables enhances the study's validity. Proposing avenues for future research, such as longitudinal studies tracking musculoskeletal health over time and exploring the effectiveness of specific ergonomic interventions, contributes to the ongoing discourse on this critical topic.

Implications for Career Sustainability:

Beyond immediate health concerns, the discussion should underscore the implications of musculoskeletal health for career sustainability within the dental profession. Proactive measures not only enhance the well-being of practitioners but also contribute to the longevity and fulfillment of their careers. By addressing musculoskeletal challenges, the dental community can foster a professional environment that supports sustained and vibrant careers.

In essence, the discussion section serves as a forum for synthesizing the study's findings, contextualizing them within existing knowledge, and charting a course for actionable recommendations. It is an opportunity to inspire change, advocate for the well-being of dental professionals, and contribute to the ongoing dialogue surrounding musculoskeletal health in dentistry.

VII.CONCLUSION

In conclusion, this study has navigated the intricate landscape of musculoskeletal disorders (MSD) among dental practitioners, shedding light on the prevalence, risk factors, and the role of ergonomics in managing these challenges. The findings presented in this study underscore the critical importance of addressing musculoskeletal health within the dental profession and provide a foundation for informed interventions.

Prevalence of Musculoskeletal Disorders:

The study's investigation into the prevalence of MSD among dental interns and post-graduate students revealed a significant concern, with a staggering 77% of participants reporting musculoskeletal pain. The neck emerged as the most commonly affected area, aligning with existing literature that highlights the neck and back as frequent sites of discomfort among dental practitioners. This high prevalence emphasizes the urgency of proactive measures to address and mitigate musculoskeletal challenges within the dental community.

Risk Factors and Occupational Challenges:

The literature review integrated into this study identified specific risk factors contributing to the development of musculoskeletal disorders in dentistry. Prolonged static postures, repetitive movements, and increased workload were identified as key contributors to musculoskeletal pain among dental professionals. The current study aligns with these findings, emphasizing the need to recognize and address these occupational challenges to prevent the progression of musculoskeletal issues.

Ergonomics as a Potential Solution:

Ergonomics emerged as a crucial factor in preventing and managing musculoskeletal disorders among dental practitioners. Existing research, as reviewed, showcased the positive impact of ergonomic interventions and education programs. However, the present study illuminated a gap between awareness and implementation of ergonomic practices among participants. Despite a high level of awareness, the adoption of ergonomic tools and practices, such as the use of saddle seats and ergonomically designed instruments, remained suboptimal.

Awareness-Action Gap:

One of the notable findings of this study was the awareness-action gap, particularly evident in the utilization of ergonomic practices. While a majority of participants were aware of ergonomic principles, the practical application of these principles in daily practice was limited. This gap signifies an opportunity for targeted educational interventions, emphasizing the translation of knowledge into actionable practices to enhance musculoskeletal health.

Implications for Intervention:

The implications drawn from this study extend beyond the identification of musculoskeletal challenges. It calls for a paradigm shift in the approach to musculoskeletal health within the dental community. Educational initiatives that bridge the awareness-action gap, promoting the integration of ergonomic practices into daily routines, are imperative. Furthermore, the study emphasizes the need for ongoing efforts in ergonomic redesigns, advocating for dental workstations and instruments that align with the natural movements and capabilities of the human body.

Enhancing Well-being and Sustainability:

By addressing musculoskeletal health, the dental community has the opportunity to enhance the overall wellbeing of practitioners and prolong the sustainability of their careers. Proactive measures, including the implementation of ergonomic practices and targeted interventions informed by the findings of this study, can contribute to a workplace culture that prioritizes musculoskeletal health.

Limitations and Future Directions:

It is essential to acknowledge the limitations of this study, including its cross-sectional nature and reliance on self-reported data. Future research could explore longitudinal perspectives to track the development of musculoskeletal issues over time. Additionally, interventions aimed at closing the awareness-action gap should be a focal point for future studies, assessing the effectiveness of educational initiatives and ergonomic redesigns in real-world dental settings.

In essence, this study serves as a call to action for the dental community to proactively address musculoskeletal health. By bridging the awareness-action gap, implementing ergonomic practices, and fostering a culture of well-being, the dental profession can embark on a trajectory that ensures the sustained and fulfilling careers of its practitioners. Through informed interventions, the dental community can navigate towards a future where musculoskeletal disorders are not just managed but prevented, ensuring a resilient and vibrant professional journey for generations to come.

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