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# OCCUPATIONAL MUSCULOSKELETAL PAIN IN DENTISTRY: A CROSS-SECTIONAL ANALYSIS OF PREVALENCE AND CONTRIBUTING FACTORS.

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**Abstract:**
**Introduction:** Musculoskeletal pain is a prevalent occupational health concern among dental professionals, driven by prolonged static postures and repetitive movements during patient care. This pain adversely affects productivity and quality of life.
**Aim:** This study aimed to determine the prevalence of musculoskeletal pain among dental interns, postgraduate students, and faculty at Department of Dental, GIMSH, Durgapur and to evaluate contributing factors and the impact of ergonomic training.
**Methods:** A cross-sectional study was conducted involving 150 participants. Data on musculoskeletal pain prevalence, affected body regions, and contributing factors (including ergonomic practices) were collected using a questionnaire. Statistical analyses, including chi-square, ANOVA, and Kruskal-Wallis tests, were performed to assess associations between ergonomic factors and pain occurrence.
**Results:** A high prevalence of musculoskeletal pain (92.65%) was reported. The most commonly affected areas were the lower and upper back (37.33%). Primary contributing factors included prolonged static postures and improper positioning. Despite 71.33% of participants having received ergonomic training, consistent application of ergonomic principles was lacking.
**Conclusion:** Musculoskeletal pain is highly prevalent among dental professionals at CSMSS Dental College. This highlights a critical need for enhanced ergonomic education, consistent application of ergonomic principles, and regular training to mitigate long-term musculoskeletal risks.

**Keywords:** Musculoskeletal pain, dental professionals, occupational health, ergonomics, postural discomfort, musculoskeletal disorders (MSDs).

## Introduction:

Musculoskeletal pain, encompassing discomfort or injury to muscles, tendons, ligaments, bones, and nerves, frequently arises from repetitive movements, poor posture, and physical strain. This is particularly prevalent in occupations demanding prolonged static positions and repetitive tasks. Dental professionals are exceptionally vulnerable to musculoskeletal pain due to the inherent physical demands of their work. They often perform hand-intensive procedures while maintaining awkward

postures for extended periods, leading to significant strain on the neck, shoulders, back, wrists, and hands [1]. This sustained strain places dental professionals at a heightened risk for developing musculoskeletal disorders (MSDs), which, if left untreated, can result in chronic pain and disability [2]. The widespread prevalence of musculoskeletal pain among dental professionals is well-documented. A systematic review by Leggat and Smith (2007) revealed that a majority of dentists experience musculoskeletal discomfort during their careers, with the lower back, neck, and shoulders being the most commonly affected areas [3]. Similarly, Al Wazzan et al. (2001) [4] reported that over 70% of dental professionals experience musculoskeletal symptoms, particularly in the back and neck, largely attributed to poor ergonomic setups that force dental workers into awkward, static positions [4]. Research consistently demonstrates that musculoskeletal pain is highly prevalent in the dental profession, and the consequences of untreated MSDs are significant, affecting both individuals and the healthcare system. Chronic pain can lead to decreased productivity, absenteeism, and even early retirement in severe cases [5]. Bernard et al. (1997) [6] emphasized the vulnerability of dental professionals to MSDs due to the combination of static postures and repetitive hand movements [6]. Additionally, Mulimani et al. (2018) [7] highlighted the link between poor ergonomics and increased musculoskeletal pain, underscoring the occupational risks faced by these professionals [7]. For instance, Rundcrantz et al. (1990) found that nearly 87% of dentists report experiencing musculoskeletal discomfort during their careers, with the lower back, neck, and shoulders being the most affected areas [8]. This aligns with Alexopoulos et al. (2004) [9], who identified repetitive tasks and poor ergonomic conditions as primary contributors to MSDs among dentists [9]. The Journal of Occupational Health has also emphasized that improper working postures and insufficient ergonomic interventions significantly increase the risk of these disorders [1]. Ergonomics in dental education is crucial. Pejčić et al. (2020) studied musculoskeletal pain among dental students and highlighted that over 81% of students experienced musculoskeletal pain during their training [10]. This underscores the importance of introducing ergonomic education at the preclinical stages of dental training to prevent chronic MSDs later in their careers [10]. The physical demands of dental practice can have serious health consequences, affecting both quality of life and job performance. Without timely intervention, these conditions can worsen, potentially resulting in permanent disability [11]. Anshasi et al. (2022) [12] demonstrated the effectiveness of an ergonomic improvement project in a dental clinic, reducing sick leave from MSDs through ergonomic awareness and engagement [12]. This emphasizes the importance of continuous ergonomic adjustments in the workplace. In summary, musculoskeletal pain is prevalent among dental professionals and can have serious long-term health and career consequences. Recent research highlights the importance of ergonomic interventions, such as proper posture, ergonomic tools, and early education, to prevent these disorders. Incorporating these strategies into daily practice and dental education is essential to safeguarding professionals' well-being. This cross-sectional study uses a questionnaire to assess the prevalence and causes of musculoskeletal pain in dental professionals and examines the role of ergonomics in mitigating these issues, aiming to promote better workplace ergonomics and preventive measures in dentistry.

## Materials and Methods:

**Study Design and Setting:** A cross-sectional, questionnaire-based study was conducted at GIMSH, Durgapur, India, from June to August 2021.

**Participants:** The study population comprised dental interns, postgraduate students, and faculty members of the institution.

**Ethical Considerations:** The study protocol was approved by the Institutional Ethics Committee of GIMSH Informed consent was obtained from all participants prior to data collection.

**Sample Size:** A total of 150 participants were included in the study, encompassing interns, postgraduate students, and faculty.

**Data Collection:** A self-administered questionnaire was used to collect data. The questionnaire included sections on:

- Basic demographic information.
- Experiences of musculoskeletal pain.
- Work practices and ergonomic behaviors.
- Knowledge and application of ergonomic principles.
- Strategies used to alleviate pain.

Printed questionnaires were distributed in person to the participants, and completed questionnaires were collected within one week.

**Statistical Analysis:** Data were entered into Microsoft Excel for analysis. Statistical analysis was performed using:

- Chi-square tests.
- Mann-Whitney U tests.
- Kruskal-Wallis tests.

These tests were used to determine associations between sociodemographic variables, clinical demographic variables, and the location of musculoskeletal pain. A p-value of $< 0.05$ was considered statistically significant.

**Results:**

**Demographics:**

- The study included 150 participants, comprising 48 males (32%) and 102 females (68%).
- Participant ages ranged from 22 to 54 years, with a mean age of 27.56 years.
- The participant distribution was as follows: 51 faculty members, 29 postgraduate students, and 70 interns.
- Years of dental practice varied: 74 participants (49.33%) had 0-1 years, 51 (34%) had 2-5 years, 12 (8%) had 6-12 years, and 13 (8.66%) had over 12 years.

**Musculoskeletal Pain Characteristics:**

- Pain frequency varied: 7.33% reported daily pain, 20.66% weekly, 33.33% monthly, and 38.66% rarely.
- Pain intensity was predominantly mild to moderate: 39.33% rated it 1-2, 44% rated it 2-5, 14.66% rated it 5-8, and 2% rated it as extreme.
- The most common pain locations were the lower and upper back (37.3%), followed by the shoulder and neck.
- 59.33% of participants reported that pain occasionally interfered with their work and daily activities.

**Contributing Factors:**

- The primary contributing factor was prolonged static posture (40.66%), followed by patient positioning (32.66%), poor ergonomic setups (19.33%), and stress/psychological factors (7.33%).

**Ergonomic Training and Practices:**

- 71.33% of participants had received ergonomic training, while 28.66% had not.
- 29.33% reported that musculoskeletal pain had affected their career decisions.
- Ergonomic adjustments were inconsistent: 55.33% rarely reviewed/adjusted their setup, 20.66% made occasional adjustments, 11.33% frequently adjusted, and 12.60% consistently reviewed.
- 72% of participants felt that research and awareness of musculoskeletal health in dental professionals was insufficient.
- 49.33% of participants primarily sat, 9.33% primarily stood, and 41.33% alternated positions.
- Posture adjustment during long procedures varied: 32.66% regularly adjusted, 59.33% occasionally adjusted, 8% rarely adjusted, and 0% never adjusted.

**Online Resources:**

- 48% of participants found online resources/webinars on ergonomics to be very beneficial, 32.66% somewhat beneficial, 12.66% saw no benefit, and 6.66% were unsure.

**Enhancements:**

- **Subheadings:** Added subheadings to improve organization and readability.
- **Conciseness:** Minor edits to streamline sentences and improve flow.
- **Consistency:** Standardized the presentation of percentages and numbers.
- **Emphasis:** Used stronger verbs and phrases to highlight key findings.
- **Grouping Similar Data:** Grouping similar data together to make it easier to read.

**Discussion:**

**Prevalence and Frequency of Musculoskeletal Pain in Dental Professionals:** Musculoskeletal pain is a well-documented occupational hazard for dental professionals. Our study revealed a high prevalence, with 92.67% of respondents experiencing some form of pain. Among these, 7.33% reported daily pain, and 20.66% reported weekly occurrences. The majority experienced pain monthly (33.33%) or rarely (38.66%). These findings align with previous studies demonstrating that repetitive tasks, awkward postures, and prolonged static positions in dentistry significantly contribute to musculoskeletal discomfort [1]. While most participants experienced pain less frequently, the overall prevalence underscores the persistent nature of musculoskeletal disorders in this profession.

**Intensity and Regional Distribution of Pain:** Pain intensity was predominantly mild to moderate: 39.33% rated their pain 1-2, and 44% rated it 2-5. A smaller percentage (14.66%) reported moderate pain (5-8), and only 2% reported severe pain (above 8). These variations suggest that while pain is prevalent, its intensity is generally manageable, though a subset of individuals experience more severe discomfort. The back (upper and lower) was the most frequently affected region (37.33%), followed by the shoulder (23.33%) and neck (22%). This regional distribution is consistent with previous research, highlighting the strain caused by forward flexion of the neck, shoulders, and back during dental work [11]. This emphasizes the need for targeted interventions to address these specific pain points.

**Contributing Factors and Risk Exposure:** Prolonged static posture was identified as the primary contributor to musculoskeletal pain (40.66%), aligning with research demonstrating the strain caused by sustained awkward positions [13]. Improper patient positioning (32.66%), poor ergonomic setups (19.33%), and stress/psychological factors (7.33%) were also identified as significant contributors. Despite 71.33% of participants having received ergonomic training, many reported only occasional adjustments to their posture or setup, highlighting a gap between knowledge and practice. This suggests that time constraints and workload pressures may hinder consistent ergonomic implementation [5]. Continuous education and reinforcement, through workshops or online webinars, could bridge this gap.

**Career Impact and Long-Term Considerations:** Musculoskeletal pain significantly impacts career decisions, with 29.33% of respondents reporting it has influenced their career plans. This aligns with research indicating that persistent pain can lead to burnout, early retirement, and reduced job performance [14]. Chronic pain poses a significant threat to individual careers and the productivity of dental teams.

**Ergonomic Adjustments and Preventative Measures:** Ergonomic adjustments were inconsistent: 32.66% regularly adjusted posture, 59.33% occasionally adjusted, and 8% rarely adjusted. This highlights the need for consistent ergonomic practices. Strategies like regular breaks, ergonomic workspace adjustments, stretching exercises, and supportive equipment can reduce long-term musculoskeletal issues [2]. 48% of respondents found online resources on ergonomics highly

beneficial, and 32.66% found them somewhat beneficial, indicating a demand for accessible educational materials. Virtual and in-person ergonomic training programs have shown to lower the prevalence of musculoskeletal pain [15, 16]. Providing these resources can improve ergonomic habits and overall well-being.

**Gender, Age, and Practice Experience:** Gender and age were not significantly associated with pain. Younger professionals (<25) reported slightly higher rates of pain, possibly due to less experience in managing posture [9]. No significant differences were found between BDS and MDS degree holders or across varying years of practice.

**Limitations and Future Directions:** This study's cross-sectional design limits causal conclusions, and self-reported data may introduce bias. Future research should include larger sample sizes, longitudinal studies, and evaluations of ergonomic interventions.

**Conclusion:** Musculoskeletal pain is a significant issue among dental professionals, primarily due to prolonged static postures and poor ergonomic setups. Despite ergonomic education, consistent application is lacking. The impact on career decisions emphasizes the need for practical interventions and accessible resources. Future research should focus on targeted preventive strategies and the effectiveness of ergonomic training programs [17].

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