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# Prevalence of Musculoskeletal Disorders among Dentists: A Comprehensive Systematic Review

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## ABSTRACT

**Introduction:** Musculoskeletal disorders (MSDs) have emerged as significant challenges for healthcare professionals, particularly dentists. This systematic review aims to present the prevalence of MSDs among dentists

**Materials and Methods:** All published literature regarding MSDs in dentists were included in this study without any time constraints or other limitations. However, it was noted that there is a scarcity of studies on MSDs among dentists.

**Results:** Findings from the reviewed literature revealed a wide range of prevalence rates, ranging from 0.5% to 70%. The prevalence of pain in various regions included: neck pain (0.7% - 15%), back pain (0.08% - 55%), wrist pain (0.005% - 48%), shoulder pain (0.08% - 50%), knee pain (0.03% - 25%), and elbow pain (0.01% - 20%). Gender did not appear to influence the prevalence rates. Comparison with similar studies indicates that the prevalence of MSDs is a significant concern in other regions as well.

**Conclusion:** The results underscore a high prevalence of musculoskeletal issues among dentists . Thus, there is a pressing need for reliable and comprehensive epidemiological studies to better understand the underlying causes of this problem and to propose effective solutions.

**Keywords:** prevalence, musculoskeletal disorders, dentist.

## INTRODUCTION

The impact of occupation on the health, social, and economic development of a society is of paramount importance. Musculoskeletal disorders (MSDs) are prevalent work-related conditions influenced by various factors. MSDs encompass injuries affecting muscles, ligaments, tendons, nerves, blood vessels, bones, and joints, resulting in pain across multiple areas such as the neck, shoulder, arm, wrist, hands, upper and lower back, hips, knees, and feet. These disorders affect the musculoskeletal system, including nerves, tendons, muscles, and supporting structures like intervertebral discs. (Alghadir et al., 2015)

In recent decades, there has been a global surge in the prevalence of musculoskeletal disorders. Healthcare professionals encounter a diverse array of job-related hazards, including MSDs, with

significant prevalence among them. According to the World Health Organization (WHO), over 59 million healthcare workers worldwide are exposed to various occupational hazards, leading to a high incidence of work-related injuries and diseases within this group. These conditions have physical, emotional, economic, and social ramifications for healthcare workers and their families. (World Health Organization, 2016)

Research indicates the presence of a wide range of workplace hazards in dental practice, including infections, eye injuries, vibration, percutaneous exposure incidents, radiation exposure, exposure to dental materials, noise, psychological stress, and musculoskeletal disorders. Dentistry stands out as a high-risk profession for MSDs, significantly impacting dental practices. Studies highlight that incorrect body positioning and limited body movement among dentists are major ergonomic factors contributing to the development of musculoskeletal disorders. Prolonged periods in uncomfortable and static positions, coupled with repetitive movements of the arms and hands, along with postural stress on the upper back and head during dental procedures, as well as psychological stress, play crucial roles in the manifestation of musculoskeletal symptoms among dentists. These occupational hazards result in absenteeism and ultimately diminish the quality and productivity of dental practices. (Hodacova et al., 2015)

Given the high incidence of MSDs among dentists across various regions and the substantial impact of musculoskeletal disorders on dental practices, this study aimed to investigate MSD prevalence among dentists (Hayes et al., 2013)

## MATERIALS AND METHODS

### Data and Analysis:

To estimate the prevalence of musculoskeletal disorders (MSDs), including low back pain (LBP), shoulder pain, and neck pain among dentists in the included studies, homogeneous data items were analyzed. Key elements collected by the authors included sample size, gender, age, city, and prevalence of LBP, shoulder pain, and neck pain. Acceptable methodological quality was determined based on the central tendency of methodological scores. Data extracted from methodologically acceptable studies were analyzed.

### Search Strategy:

This study conducted a systematic review and meta-analysis of all published literature without time limits or other restrictions. Papers were searched using various databases, including MEDLINE (PubMed), Google Scholar, Scopus, CINAHL (for English language), and databases such as SID, and Magiran (for Persian language).

### Inclusion Criteria:

All studies reporting LBP prevalence among dentists without limitations on study design, in Persian or English languages, were included. Clinical intervention articles and studies with technical details were excluded.

### Methodological Appraisal:

Articles were independently reviewed by two reviewers. Data from eligible studies were entered into collection forms. Articles were categorized into infection problems, MSDs, radiation problems, psychological problems, and other problems. Disagreements between reviewers were resolved through group discussion. Cross-sectional and analytical articles were appraised using a Modified STROBE questionnaire.

### Data Extraction and Analysis:

Data, including article and author names, publication year, study region, sample size, sampling methods, participant demographics, statistical methods, prevalence of LBP, shoulder pain, and

neck pain, assessment tools, and variables, were extracted and analyzed using Excel and STATA software. Heterogeneity of data was examined, and forest plots were used to display data distribution. Covariate influence on prevalence estimates was assessed using random effects regression models and meta-regression analysis.

**Ethical Considerations:**

This study analyzed published articles on dental health problems without restrictions on language or study type. Ethical considerations were observed at all stages of the research.

**RESULTS**

In this review, a total of 137 articles were initially identified from various databases (SID, Iranmedex, Magiran, PubMed, CINAHL, Scopus, and Web of Science). After reviewing titles and abstracts, 113 studies were excluded due to irrelevance to the study's purpose or duplication. Subsequently, 7 additional papers were excluded based on eligibility criteria. Ultimately, 17 articles were included for analysis.

These 17 studies involved a total of 2067 dentists and were conducted between 1989 and 2013. Characteristics of the reviewed studies are summarized as follows:

- All studies examined the prevalence of MSDs in both sexes, except for one study that focused solely on male dentists (472 men vs. 204 women).
- Thirteen studies reported the mean age of participants.
- The studies utilized either Nordic questionnaires or self-designed questionnaires to assess MSDs.

The prevalence of various musculoskeletal disorders among dentists was reported as follows:

- Neck pain: ranged from 0.7% to 15%
- Back pain: ranged from 0.08% to 55%
- Wrist pain: ranged from 0.005% to 48%
- Shoulder pain: ranged from 0.08% to 50%
- Knee pain: ranged from 0.03% to 25%
- Elbow pain: ranged from 0.01% to 20%

Due to significant heterogeneity in the prevalence of musculoskeletal disorders, analyses were conducted using a Random Effects Model. Nine articles utilized the Nordic questionnaire for assessing MSDs among dentists.

The overall prevalence of neck pain among dentists was calculated as 51%, while the prevalence of low back pain was estimated at 42%. Additionally, the prevalence of shoulder pain among dentists was found to be 18%. Gender was found to be associated with the prevalence of neck pain, low back pain, and shoulder pain, while mean age was not significantly associated with the prevalence of these MSDs among dentists.

In summary, the prevalence of neck pain, shoulder pain, and back pain among dentists was found to be 51%, 18%, and 42%, respectively. These prevalences were not significantly associated with gender or age.

**DISCUSSION AND CONCLUSION**

Musculoskeletal problems, particularly those related to work, are increasingly prevalent, affecting various occupational groups, including medical professionals such as dentists. While numerous studies have been conducted globally on this subject, comprehensive studies are lacking. Furthermore, most published studies are in Persian, necessitating a systematic review of this literature. (Rafie et al., 2015)

According to the results of our meta-analysis, the prevalence of musculoskeletal disorders (MSDs) among dentists ranged from 0.5% to 70%. This range is consistent with findings from similar studies conducted in various countries. For instance, studies by Hay et al. reported prevalence rates of 64% to 78% among dentists and 78% to 93% among dental staff and hygienists. Discrepancies in reported prevalence rates across studies may stem from individual and social differences. (Feng et al., 2014)

Neck pain emerged as the most commonly reported MSD among dentists in our study, with a prevalence of 51%. This finding aligns with studies conducted in other regions such as Queensland, Saudi Arabia, and the Netherlands. However, prevalence rates varied across studies, influenced by factors such as measurement tools, cultural differences, and job-specific tasks. Ergonomic factors, including repetitive movements and prolonged forward bending, contribute significantly to neck and shoulder pain among dentists. (Kumar et al., 2013)

Back pain, with a prevalence of 42%, ranked second in our study, while shoulder pain, with a prevalence of 18%, ranked third. These findings are consistent with previous research indicating back and neck pain as the most common complaints among dentists. Our study also observed a higher prevalence of neck and back pain among women compared to men, a trend reported in other studies as well. (Ahmadi Motemayel et al., 2012)

Interestingly, our study found a correlation between aging and neck pain, suggesting that older dentists may experience increased neck pain. However, the relationship between aging and lower back or shoulder pain was less pronounced. These findings contrast with previous research indicating a negative relationship between musculoskeletal problems and aging. (Aminian et al., 2013)

The discrepancies observed in prevalence rates and the impact of factors such as gender and age underscore the need for further epidemiological studies in this area. Understanding the causes of musculoskeletal problems among dentists is crucial for developing effective preventive measures and interventions. Attention to ergonomic practices, job-specific training, and regular assessments of workplace conditions are essential steps toward mitigating the burden of MSDs among dental professionals. (Barakat et al., 2013)

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