

# Musculoskeletal Disorders in Dentists: A Systematic Review

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## Abstract:

*Background: Musculoskeletal disorders (MSDs) are the most important occupational health problems particularly in dentists. Technological advancements in the field of dental equipment and material-shave not fully eliminated the musculoskeletal problems of dentists.*

*Methods: This systematic review began with a search of a range of a relevant articles from May to July 2017 in Google Scholar with the key words musculoskeletal disorders, dental practitioners, dentist, risk factors. According to the inclusion and exclusion criteria of the manuscript a total 13 original articles were included for this review work.*

*Results : This review work observed the highest overall prevalence of MSDs among dental practitioners were 92% with the most prevalent regions for pain in dentists have been shown to be the neck (41-75.7%), lower back (35–73.5 %) and shoulder (29–43.3%). Different risk factors have been identified, including inadequate postures, long working hours without pause, direct inspection, physical load, repetitive movements etc.*

*Conclusion: Overall, the review emphasizes that MSDs represent a significant burden for the dental professionals. Further studies are required including large sample size to be able to reach valid conclusion and be able to generalize results.*

*Key words: Musculoskeletal disorders; Dentist; Dental practitioners; Occupational health*

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Introduction:

Dentistry is a demanding profession involving high degree of concentration and precision. Dentists require good visual acuity, hearing, depth perception, psychomotor skills, manual dexterity, and ability to maintain occupational postures over long periods. Diminution of any of these abilities affects the practitioner's performance and productivity. Despite numerous advances in dentistry many occupational health problems still persist in modern dentistry.<sup>[1]</sup> Musculoskeletal symptoms are a major concern among dental practitioners. Musculoskeletal disorder is characterized by presence of discomfort, disability or persistent pain in the joints, muscles, tendons, and other soft parts, caused or aggravated by repeated movements and prolonged awkward or forced body postures.<sup>[2]</sup> Dentists are susceptible to develop this disorder. The physical load among dentists seems to put them at risk for the occurrence of musculoskeletal disorders. These disorders are not the result of a single event, but develop over time.<sup>[3]</sup> Despite numerous advances in dentistry many occupational health problems still persist in modern dentistry.<sup>[1]</sup> Different studies have indicated a wide variety of causative factors associated with musculoskeletal pain in dental professionals. The physical burden of clinical work has been established as having a strong association with MSDs in dental health workers<sup>[4,5]</sup>; however, evidence is mounting which suggests that psychosocial factors may also be associated with the prevalence of MSDs.<sup>[4,6]</sup> The aim of this review work is to analyze critically the literatures and reports on the prevalence of musculoskeletal pain and possible risk factors of this problem in dental practitioners who are registered dental surgeons working in respective area.

Methodology:

This systematic review began with a search of a range of relevant articles from May to July 2017 in Google Scholar. The keywords used in the search strategy are –

1. Musculoskeletal disorders
2. Dental practitioners
3. Dentist
4. Risk factors

The papers identified by the search strategy were considered for possible relevance to this literature review work. The criteria for inclusion of manuscript was the original articles published in English peer reviewed journals, where researched the prevalence

of MSDs and the risk factors for this disorders among dental practitioners. The search strategy uncovered a total 37 titles. After examining the titles, keywords and abstracts (excluding any duplicates) the complete manuscript of 21 potentially relevant articles were gathered. The papers were chiefly excluded on the basis that the study did not measure the prevalence of MSDs or possible risk factors. Finally 13 articles were included for this review.

Results:

Table 1 : Prevalence of musculoskeletal disorders among dental practitioners by country, year of publication

Sl No	Study title	Study design	Sample size	Tools used	Country	MSDs prevalence (%)	Author & year	Reference
1	Work-related musculoskeletal disorders among dentists- A questionnaire survey	Cross-sectional study	220 dentists	Semi structured Questionnaire consisting three sections	Poland	More than 92% of the surveyed dentists experienced MSDs, especially in the neck (47%) and lower back (35%). More than 29% of the dentists experienced trouble with fingers, 23% with hip, whereas 20% demonstrated problems in the midback, and also in the shoulders (20%).	Anna K et al.2011	7
2	Prevalence of work-related musculoskeletal complaints among dentists in India: A national cross-sectional survey	Cross-sectional survey	646 dentists	Self-administered questionnaire which based on Nordic questionnaire	India	The prevalence was neck (75.74%), followed by wrist/hand (73.13%), lower back (72.01%), shoulder (69.4%), hip (29.85%), upper back (18.65%), ankle (12.31%), and elbow (7.46%).	Vijaya K, K et al.2013	8
3	Frequency of Musculo-Skeletal Pain in Dentists Working in Public and Private Sector Dental Hospitals of Peshawar, Pakistan	Cross-sectional study	104 dentists	Semi structured questionnaire	Pakistan	56% of the dentists experienced backache, followed by 41% pain in neck and 32% had pain in hand	Arifidi S et al.2012	9
4	Musculoskeletal Disorders among Dental Practitioners: Does It Affect Practice?	Cross-sectional study	80 dentists	Standardized Nordic Questionnaire	India	The overall prevalence was 78%, the most common areas affected with MSD in order of magnitude were the neck (52%), low back (41%), shoulders (29%), and wrists (26%)	Dhanva M et al.2013	10
5	Musculoskeletal disorders among dental surgeons at selected private dental hospitals in dhaka city	Descriptive cross-sectional study	96 dental surgeons	Semi structured Questionnaire	Bangladesh	The current study revealed that among the respondents 90% are suffering from pain during work in last 3 months.	Jahan KMR et al.2015	11
6	Musculoskeletal pain and ergonomic aspects of dentistry	Self-administered questionnaire	90 dentists	self-applicable questionnaire	Bm	This study found there has been job-related pain in at least 65.67% of dentists	Garbin AII et al.2015	12
7	Prevalence of musculoskeletal disorders among dentists in the Ha'il Region of Saudi Arabia	A cross-sectional questionnaire study	80 licensed dentists	A self-administered questionnaire, based on the Nordic Musculoskeletal Questionnaire (NMQ)	Saudi Arabia	The prevalence of MSDs among respondents was 77.9% (n=53) with the most commonly affected areas the lower back (73.5%) (39/53) followed by the neck (66%) (35/53) and the shoulders (43.3%) (23/53).	Aljanak h M et al.2015	13

Table 2 : Risk factors of musculoskeletal disorders among dental practitioners

Study title	Study design	Sample size	Country	Key findings	Author & year	Reference
Musculoskeletal pain and ergonomic aspects of dentistry	Cross-sectional study	90 dentists	Brazil	Risk factor: This study showed high prevalence of musculoskeletal pain related to inadequate postures adopted during clinical assistance and to long working hours without pause.	Garbin AJI et al.2015	12
Musculoskeletal Disorders in Dentists	Cross-sectional survey	92 dentists	Iran	Risk factor: Direct inspection was a risk factor for neck pain (OR: 35.34, $p < 0.001$ )	Maryam R et al.2012	14
Prevalence of musculoskeletal disorders in dentists	Cross-sectional study	430 dentists	Greece	Risk factor: Self-reported factors of physical load were associated with the occurrence of back pain (OR = 1.59), shoulder pain (OR = 2.57) and, hand/wrist pain (OR = 3.46). Physical load showed a trend with the number of musculoskeletal complaints with ORs of 2.50, 3.07 and 4.40 for two, three and four musculoskeletal complaints, respectively.	Evangelos C A et al.2014	15
Prevalence of Upper Extremity Musculoskeletal Disorders in Dentists: Symptoms and Risk Factors	Cross-sectional study	130 dentists	India	Risk factor: Significant relationships were observed between musculoskeletal pain and daily work hours ( $P = 0.07$ ) and number of patients ( $P = 0.02$ ), but the pain was not significantly associated with BMI and experience.	Forouzan Ret al.2011	16
Frequency of Musculo-Skeletal Pain in Dentists Working in Public and Private Sector Dental Hospitals of Peshawar, Pakistan	Cross-sectional study	104 dentists	Pakistan	Risk factor: Backache was found to be significantly associated with working position, years in practice; number of patients treated per day and breaks taken between patients, neck pain was related to years in practice.	Arfidi S et al.2012	9
A risk assessment study on work-related musculoskeletal disorders among dentists in Bhopal, India	Cross-sectional study	93 dentists	India	Risk factor: This study found that younger participants, male (OR = 4.1), involved physical activity (OR = 1.04), dentists not taught about ergonomics in their dental school (OR = 1.69) or never attended any workshops (OR = 1.38), who reported task involving sustained muscle contraction (OR = 1.12) or task with repetitive movements (OR = 1.11) are the major risk factors for the development of MSDs among the dentists.	Batham C et al.2016	17

### Discussion:

Musculoskeletal disorders account for the most common reason (29.3%) for early retirement in dentists worldwide. The key to preventing musculoskeletal disorders is to understand potential risk factors. The findings from this literature review were sourced from 13 original articles which has been conducted in different countries among dental practitioners. In several studies musculoskeletal symptoms were assessed by Standardized Nordic Questionnaire (REF) which is a valid and accepted screening tool for assessing MSDs, other method included pilot tested surveys, self administered questionnaire. The highest overall prevalence of MSDs among dental practitioners were observed 92% in this review. [7] The overall prevalence of musculoskeletal disorders in dentistry differs from 63 to 93 % worldwide. [18] MSDs in different body area it was found in the study conducted by Anna K et al.2011 [7] especially in the neck (47%) and lower back (35%). More than 29% of the dentists experienced trouble with fingers,

23% with hip, whereas 20% demonstrated problems in the midback, and also in the shoulders (20%). The body area wise prevalence in an Indian study conducted by Vijaya K K et al.2013<sup>[8]</sup> was neck (75.74%), followed by wrist/hand (73.13%), lower back (72.01%), shoulder (69.4%), hip (29.85%), upper back (18.65%), ankle (12.31%), and elbow (7.46%). Another study of Pakistan<sup>[9]</sup> showed that 56% of the dentists experienced backache, followed by 41% pain in neck and 32% had pain in hand, where in an Indian study according to Dhanya M et al.2013<sup>[10]</sup> the overall prevalence of MSDs was 78%, the most common areas affected with MSDs in order of magnitude were the neck (52%), low back (41%), shoulders (29%), and wrists (26%). In our country there are severe scarcity of data regarding this issue. One Bangladeshi study conducted by Jahan KMR et al.2015<sup>[11]</sup> showed that 90% surveyed dentists were suffering from musculoskeletal pain during work in last 3months. In Brazil a study conducted by Garbin AJI et al.2015<sup>[12]</sup> showed that 65.67% dentist had job related pain, where as in Saudi Arabia the prevalence of MSDs among respondents was 77.9% (n=53) with the most commonly affected areas the lower back (73.5%) (39/53) followed by the neck (66%) (35/53) and the shoulders (43.3%) (23/53).<sup>[13]</sup> According to these studies the most prevalent regions that dentists experienced musculoskeletal symptoms were back, neck and shoulder region, [7,8,9,10,13] however the reported prevalence for these regions varied to some extent between studies. About identification of risk factors of MSDs the review result uncovered different risk factors according to different studies in different countries in which inadequate posture during dental work is an important risk factor. In the study Garbin AJI et al.2015<sup>[12]</sup> showed high prevalence of musculoskeletal pain related to inadequate postures adopted during clinical assistance and to long working hours without pause. With this, it was also observed that many professionals would rotate their heads during consultations (73.13%), their spine (47.76%) and that the position of their legs was less than 90° with regard to the floor during work (91.04%). That study also mentioned when relating pain to gender, no statistically significant association has been found, but the prevalence of pain was higher among female dentists (67.86%). Direct inspection was a risk factor for neck pain (OR: 35.34,  $p < 0.001$ )<sup>[14]</sup>, where as in the study Evangelos C A et al 2014<sup>[15]</sup> showed that physical load were associated with the occurrence of back pain (OR = 1.59), shoulder pain (OR = 2.57) and, hand/wrist pain (OR =

3.46). Physical load showed a trend with the number of musculoskeletal complaints with ORs of 2.50, 3.07 and 4.40 for two, three and four musculoskeletal complaints, respectively. In India the study conducted by Forouzan R al.2011<sup>[16]</sup> found significant relationships between musculoskeletal pain and daily work hours ( $P = 0.07$ ) and number of patients ( $P = 0.02$ ), but the pain was not significantly associated with BMI and experience. Another study conducted by Batham C et al.2016<sup>[17]</sup> found that younger participants, male (OR = 4.1), involved physical activity (OR = 1.04), dentists not taught about ergonomics in their dental school (OR = 1.69) or never attended any workshops (OR = 1.38), who reported task involving sustained muscle contraction (OR = 1.12) or task with repetitive movements (OR = 1.11) are the major risk factors for the development of MSDs among the dentists. An interesting fact of this study is that this study showed those dentists who were unaware of ergonomics either through taught in school (OR = 1.69) or through any workshops (OR = 1.38) are at more risk of developing MSDs in their professional life. Backache was found to be significantly associated with working position, years in practice; number of patients treated per day and breaks taken between patients, neck pain was related to years in practice according to the study conducted by Arfidi S et al.2012<sup>[9]</sup> which also supports the study<sup>[17]</sup> findings. This review work did not include the papers that were unpublished, only published original articles were included according to the inclusion criteria of the study, which may be considered as a limitation of this review work. Moreover in study selection there may some selection bias to include different countries study in the review work.

**Conclusion :** From this review work it can be concluded that MSDs represent a significant burden for the dental professionals. A number of possible risk factors for the development of musculoskeletal disorders uncovered with this review work. Further studies are required including large sample size to be able to reach valid conclusion and be able to generalize results.

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