



Original Research Article

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THE MAJOR RISK FACTORS OF MUSCULOSKELETAL PAIN AMONGST DENTAL STUDENTS- A PREVALENCE BASED STUDY

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ABSTRACT: Background: The inappropriate setup of the working area causes a dentist to practice harmful working postures while performing various treatment procedures. This can result in injuries and makes a negative impact on their health as well as the financial aspect. Aim and Objectives: The aim of this study was to determine the prevalence of musculoskeletal pain in various regions of the body, among dental students, as well as to find a possible correlation of this with the working posture, rest taken and day to day curricular and extracurricular activities. Methods: The study was conducted among 110 dental students in clinical years. Students were evaluated on the basis of a self-prepared questionnaire consisted of questions regarding their demographic information and the site and severity of musculoskeletal pain experienced. The severity of pain was assessed by using Visual Analog Scale (VAS). Results: Most of the subjects had a mild-to-moderate level of severity of pain. 72 students had pain of with moderate to severe intensity in one or more regions. Females reported greater intensity of pain then males. The majority of the dentists (70%) treated 1–3 patients per day. Most of the students (47.2%) reported awkward working posture as the major cause of pain. Conclusion: Dental professionals demonstrate a high prevalence of musculoskeletal pain. Henceforth, present study recommends more workshops to create awareness about ergonomics in dental students for reducing the incidence of musculoskeletal pain.

KEYWORDS: musculoskeletal pain, dentist, sleep, ergonomics

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1. INTRODUCTION

Musculoskeletal disorders refer to the injuries or pain in the human musculoskeletal system and its supporting structures.[1] Work related musculoskeletal disorders (WMSD) can arise due to sudden exertion, repetitive strain, or from repeated exposure to force, vibration, or awkward posture.[2] It can affect various parts of the body including upper and lower back, neck, shoulders and extremities (arms, legs, feet, and hands) and can lead to various serious conditions including carpal tunnel syndrome, epicondylitis, tendinitis, back pain, tension neck syndrome, and hand-arm vibration syndrome.[3] Apart from various other occupational hazards including percutaneous injuries, inhalation of noxious chemicals, loss of hearing, dental professionals are commonly exposed to WMSDs.[4] An overall estimated prevalence of WMSD among dentists ranges between 64-93% with back and neck listed as the most prevalent areas for pain. The sedentary dentistry leading to imbalance in specific muscles has dramatically increased the incidences of WMSDs in dental professionals.[5] Dental students who have started with their clinical years are no exception. Small working area and need for precision leads to assumption of static and awkward working postures which along with repetitive work, and prolonged standing can result in damage to muscles, joints, bones, ligaments, tendons, nerves, and blood vessels, which can then lead to pain, fatigue, and various WMSDs.[2,6,7] It is important to highlight this issue as it can considerably result in increase in sick leaves, reduced productivity and future possibility of leaving the profession at an early age. Also it can lead to various systemic conditions including varicose vein and postural defects. [8,9,10] In view of this present study was undertaken to study the prevalence of musculoskeletal pain in various regions of the body, among dental students in their clinical years, as well as to find the possible risk factors associated with greater intensity of pain.

2. MATERIALS AND METHODS

A total of 112 dental students (71 females [63.4%] and 41 males [36.6%]) volunteered to participate in the study. Out of which two students had a previous history of musculoskeletal disorder thus, were excluded from the study. The study was conducted on 110 students (69 females [62.7%] and 41 males [37.3%]), who completed a self-prepared questionnaire. All the participants were aged between 23-29 years of age with a mean age of 23.7 ± 2.5 years. Ethical clearance was obtained before the commencement of the study. All the students were assessed on the basis of a self-prepared questionnaire which was divided into three parts. First part included their basic information like their age, sex, relevant medical history which included the mention of the disease which can cause musculoskeletal pain, exercises performed by them and its frequency, their total sleeping hours. Part two pertained to their total working experience (in clinics) (in years/months/days), habitual work posture, number of patients treated per day, rest in between work and stretching exercise performed in between work. The third part consisted of the questions regarding the musculoskeletal pain they have experienced in past 12 months and what according to them is the major cause of that pain. The

musculoskeletal pain was assessed with the help of a postural discomfort chart to identify the regions in which they experienced pain in the past 12 months. The intensity of the pain was assessed with the help of visual analog scale which had score from 0-10 in which 0 signifies no pain and 10 is the worst pain possible. The data of the students reporting musculoskeletal pain in one or more areas was collected and used for the statistical analysis.

3. RESULTS AND DISCUSSION

One hundred twelve dental students, including postgraduate students and undergraduate students who were in their clinical years of the dental college, participated in the study. Out of which, two students having history of previously diagnosed musculoskeletal disorders were excluded. The selected participants had an average age of 23.7 ± 2.5 years. Descriptive data are presented in (Table-1). Among the total of 110 subjects, 41 were male and 69 were female dental students. All the students reported pain in one or more body parts thus; the incidence of musculoskeletal pain among them was 100%. Among the sites of injury, lower back predominated at 72.7% followed by neck at 71.2% and shoulder at 63.6%.(Figure-1)

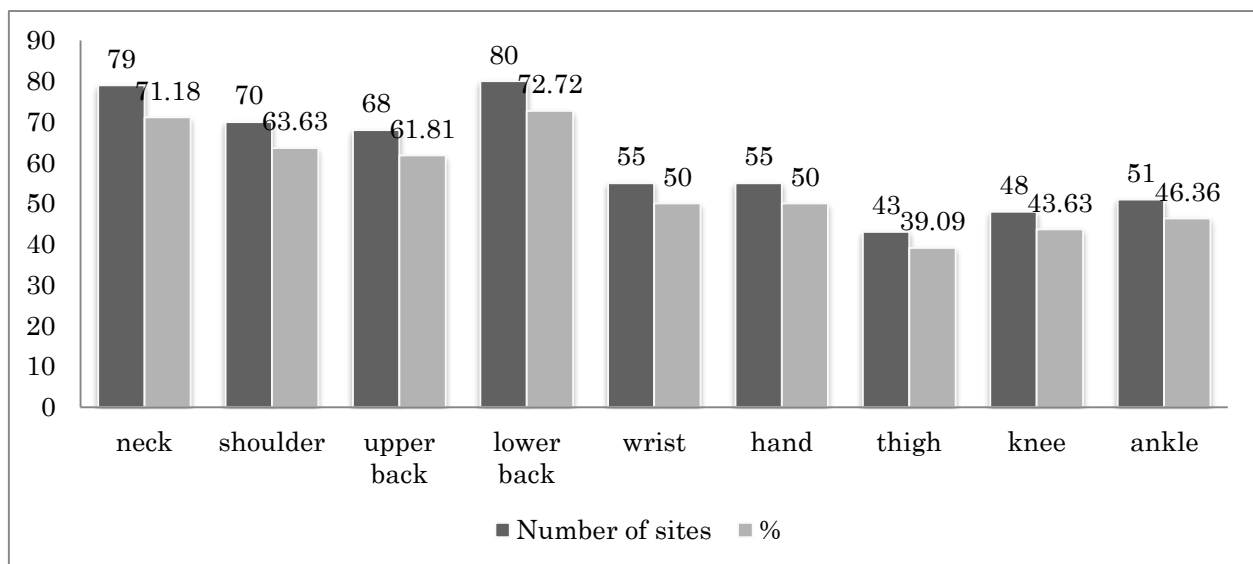


Fig.1 Distribution of location of pain

A severity of injury analysis showed that 72 subjects reported musculoskeletal pain of more than or equal to 5 intensity in one or more sites.(Table-2) 76.8% of the total females and 46.6% of the total males (P: 0.0012) reported musculoskeletal pain of greater than or equal to 5 intensity, at one or more sites. 97.5% of those students never performed exercise (P: <0.001) and 81% of those who never took rest in between work (P: 0.002). 62% students had work experience of less than 3 years (P: 0.888). Most of the dental students (70%) were treating 1–3 patients per day, in sitting posture (58%) (P: 0.029). 81.2% students had their sleeping of less than 7 hours (P: 0.0013). The most common cause of this musculoskeletal pain reported according to the students was awkward working posture (47.2%) followed by working in a static posture for longer period of time (38.2%) and lack of rest (14.6%).

DISCUSSION

The present study was conducted to investigate the prevalence of, and to identify risk factors associated with greater intensity of musculoskeletal pain among dental students. This study supports the fact that WMSD is a major concern for dental students during their clinical years.[11] Every student in this study reported musculoskeletal pain in one or more region making its prevalence as 100%. The results of this study were much higher than those previously reported in the literature, reporting the prevalence of WMSD, in between 62% to 92.3%. [5] 72 students (65.5%) reported musculoskeletal pain of intensity more than or equal to 5 on the visual analog scale. The findings of this study, suggests that gender plays a potential risk factor for the development of WMSD. 76.8% of the total females and 46.6% of the total males reported pain intensity of greater than or equal to 5. This can be attributing to the lower muscle tone and smaller body of females. Also they are easily affected by psychosocial factors making their body more prone to injury leading to WMSD. [12,13] The students who performed exercise weekly reported less intensity of pain. Whereas, the students who never exercised, reported pain of more intensity followed by those who did exercise daily. Strength exercises with intensity of 70-85% of Repetition Maximum performed (RMP), three times a week for 20 minutes are able to reduce musculoskeletal pain in shoulders, wrists, cervical, thoracic and lumbar spine.[14] Aerobic activity decreases experience of pain, assists in weight loss and strengthens the torso. Stretching of muscles also assists in relieving back pain. Muscle relaxing exercises and rest were found to ease the pain; while lack of exercise was strongly associated with back pain.[15] Szymanska's study, however, found no significant relationship between physical activity and pain.[16] Too much exercise and intense exercises which are not performed correctly, can also lead to the development of musculoskeletal pain due to muscle tissue damage, with the wear and tear of daily activities. Also, trauma to an area due to jerking movements, auto accidents, falls, fractures, sprains, dislocations, and direct blows to the muscle also can cause increase in the previously present musculoskeletal pain. [17] Another important finding of this study is the association of intensity of musculoskeletal pain and sleeping hours. 81.2% of the students who had less than 7 hours of sleeping reported moderate to severe musculoskeletal pain, whereas only 31.5% students with sleeping hours more than 7 reported pain of greater than or equal to 5 intensity. According to Joint Consensus Statement of the American Academy of Sleep Medicine and Sleep Research Society sleep of seven or more hours per night on a regular basis is necessary for promoting optimal health.[18] Sleeping of less than 7 hours per night can cause impaired immune function, increased pain, impaired performance, increased errors, and greater risk of accidents.[19] A few studies in humans, support the notion that sleep deprivation produces hyperalgesic changes can cause an increased sensitivity to pain.[19,20] In this study, students who have less than 3 years of working experience in clinics experienced more intensity of pain. This is in accordance with various studies[21,22,23] according to which that more than 70% of dental students experience

WMSD in their early clinical years. This may be because of the fact that with more working experience operator better knows how to adjust their work posture to avoid such problems.[8] In various studies, position of the operator while performing treatment was identified as one of the major factor, contributing to WMSD.[8,24,25,26,27] It was reported that, bending and twisting of the neck and torso, prolonged standing during clinical work along with neck extension, flexion and rotation can be attributed as, the possible risk factors contributing to discomfort and development of musculoskeletal pain among dental practitioners.[27] These practices leads to fatigue and a decrease in microcirculation, increase in pressure and insufficient removal of lactic acid thus, leading to pain.[8] Also, forward head posture and neck position, specially during standing position may predispose to tension neck syndrome, causing pain, stiffness, and muscle spasm with referring pain between shoulder blades.[26] Therefore, it is recommended that dentists should alternate between standing and sitting position while working so as to make different set of muscles work at different times thereby, allowing the other set of muscles to relax. Furthermore, it was also reported that prolonged standing further puts the dentist at risk of varicose veins and hemorrhoids.[8] The three majorly affected regions found in this study were lower back, neck and shoulder with a prevalence of 72.7%, 71.2% and 63.6% respectively. These findings are similar to various other studies.[28,29,30] The major cause that these areas are highly affected could be the increase mobility of cervical and dorsal regions within the lumbar and cervical curves thus, making them prone to injury. [31] The major cause of musculoskeletal pain reported in this study is, awkward working posture. These postures if practiced for longer duration can lead to ischemia, microtears and injury and over the time, may compress the nerves encapsulated in tendon sheaths and can cause nerve dysfunction for example, as seen in carpal tunnel syndrome and formation of trigger points. The other causes include working in static posture for prolonged period and lack of rest.[11] It is important to address this issue as WMSD in dentistry, as it might contribute considerably to sick leave, reduced productivity and future possibility of leaving the profession at an early age. These disorders make an operator more susceptible, towards neuro-circulatory disease, postural defects thus affecting their general health and well-being. It is suggested that good ergonomic practices can prevent a number of WMSD conditions.[28] Also, considerations such as taking micro-breaks of 50 seconds in between treating patients, lessening the hours using vibrating instruments and even finger exercise would be useful in reducing the muscle strain and optimizing the strength capacity of the operator.[27]

4. CONCLUSION

This study demonstrates that WMSD represents an important issue which needs to be highlighted. To reduce the pain and discomfort it is important for the students to practice and maintain optimal posture and select proper ergonomic instrument. Ergonomics should be covered and taught as part of the dental curriculum to reduce risks of WMSD in the future. It is important to take rest in between

work. Stretching exercises can also be done to relax the muscles during this rest period.

Prevention of chronic pain requires that dentists have more knowledge, change their habits, select proper ergonomic equipment, and have a break after each operation with stretching exercise. Musculoskeletal pain should not be avoided and if required, medical intervention should be done at early stages.

5.ACKNOWLEDGEMENT

none

6. CONFLICT OF INTEREST

none

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SUPPLIMENAY FILES

Table 1: Distribution table of demographic parameters and working characteristics

Risk Factors		Number (n=110)	%
Sex	male	41	38.2
	female	69	61.8
Exercise performed	daily	39	35.4
	weekly	31	28.18
	never	38	34.54
Total sleeping hours	≥ 7	62	56.36
	< 7	48	43.63
Total working experience	≤ 3	69	62.72
	> 3	41	37.27
Number of patients per day	1 to 3	77	70
	4 to 6	25	22.72
	> 7	8	7.27
Habitual working posture	sitting	76	69.09
	standing	34	30.9
Rest in between work	yes	62	56.36
	no	48	43.63
Cause of Pain	working in static posture awkward working posture lack of rest	42	38.18
		52	47.27
		16	14.54

Table 2: Distribution table of risk factors associated with musculoskeletal pain of ≥ 5 intensity

Variables		Frequency (<5) %		Frequency (≥ 5) %		p-value	Chi- square value
Sex	female (n=69)	22	53.6	53	76.8	0.0012*	10.56
	Male(n=41)	16	23.1	19	46.6		
Sleeping hours	<7(n=48)	9	18.7	39	81.2	0.0013*	10.38
	≥ 7 (n=62)	30	48.3	32	51.6		
Total working experience	≤ 3 (n=69)	26	37.6	43	62	0.888	0.019
	> 3 (n=41)	16	39.02	25	60		
Habitual working posture	Sitting(n=76)	32	42.1	44	58	0.029*	4.75
	Standing(n=34)	7	20.05	27	79		
Rest	No(n=62)	29	46.7	39	81	0.002*	9.397
	Yes(n=48)	9	18.7	33	53		
Exercise	Daily(n=39)	16	41.02	23	58.9	0.001*	33.99
	Weekly(n=31)	21	67.7	10	32.2		
	Never(n=40)	1	2.25	39	97.5		