

Physical Fitness and Prevalence of Musculoskeletal Pain amongst Dentists and Dental Students in Mumbai City: A Questionnaire-based, Cross-sectional Study

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Authors' contributions

This work was carried out in collaboration between all authors. Author AKK was responsible for the initial conception of the project. Authors GP and KSK designed the study. Authors AKK and KSK managed sampling and data collection. Author GP wrote the first draft of the manuscript. All authors contributed to data analysis and read and approved the final manuscript.

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ABSTRACT

Introduction: Musculoskeletal pain is one of the most common complaints amongst dental healthcare professionals by virtue of the precision of work demanded from them, which leads to unnatural, static postures and repetitive precise movements.

Objective: The current study was designed to determine the prevalence of musculoskeletal pain and the level of physical activity in dentists and current dental students in the city of Mumbai, India and if any correlation exists between the two.

Materials and Methods: In the current cross-sectional study, a questionnaire containing twelve questions was circulated to 600 dentists and current dental students across Mumbai city by the means of WhatsApp® messages, Facebook® messages and email.

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Results: The current study showed that, 82.10% dentists and dental students had suffered musculoskeletal pain in the last 24 months with 20.79% of respondents reporting the pain to be severe enough for them to stop the practice of dentistry at least temporarily. 78.82% of the respondents took a break during their work. The level of physical activity was 26.21% and the prevalence of musculoskeletal pain was significantly less in dentists and dental students who indulged in physical activity.

Conclusion: There is a high prevalence of musculoskeletal pain in the dentists and dental students in Mumbai city and a low prevalence of physical activity in them. There is a direct correlation in the level of physical activity and the prevalence of musculoskeletal pain.

Keywords: Physical activity; musculoskeletal pain; dentist; dental students.

1. INTRODUCTION

Dentists are exposed to many types of hazards while performing routine professional duties, for example, exposure to chemicals like mercury and acids, the risk of infection transmission and needle stick injuries, musculoskeletal disorders because of long static positions and repetitive precise movement [1]. All the above are categorized as occupational hazards that cannot be avoided. But some of them can be minimized or their ill effects delayed by using preventive procedures. Musculoskeletal disorders (MSD) are foremost in this category. The term "musculoskeletal disorders" denote health problems of the locomotor apparatus, i.e. of muscles, tendons, the skeleton, cartilages, ligaments and nerves [2]. Though no definition of Musculoskeletal pain finds a mention in literature, it can be described as a discomfort stemming from the muscle, ligament, tendon and bones. Work-related musculoskeletal disorders are known to be the leading cause of temporary work disability, second only to the common cold [3]. The most common presenting symptom of musculoskeletal disorders is musculoskeletal pain. Musculoskeletal disorders can not only impact the physical health of the dentist but also have a profound psychological and economic impact [4] if they are severe enough to prevent the dentist from discharging their duties [5,6].

The prevalence of musculoskeletal disorders in health care professionals is higher than the general population. Bihari et al. [7] in 2011 reported the prevalence of 25.9% in the general population of the national capital region of India while Yasobant et al. [8] in 2014 reported a prevalence of 50.7% in an investigation of work-related musculoskeletal disorders in healthcare professionals. It is even higher in dentists and dental students. In various studies conducted amongst Indian dentists, the prevalence of at least one symptom of MSD was reported

between 78% to 93.87% [9,10]. The high prevalence of MSD in dental professionals can be attributed to an array of factors like the age of the dentist, number of years in practice, the number of daily work hours and whether break is taken between patients, an ergonomic work environment, the presence or absence of some form of physical activity and the nature, duration and frequency of the same.

Hence, on the basis of the above-mentioned background, this study was formulated.

1.1 Aims and Objective of the Study

The objective of the current study was to find the prevalence of musculoskeletal pain in the past two years amongst dentists and dental students in Mumbai city, and if it has any correlation to the nature, duration and frequency of the physical activity performed by the dental health care professionals. This study also aims to find out if a correlation exists between the prevalence of musculoskeletal pain and the age of the dentist, the number of days of practice, the number hours of practice and whether they take a break in between patients.

2. MATERIALS AND METHODS

A questionnaire was developed with twelve questions regarding various aspects to be investigated using Google Forms® (<https://docs.google.com/forms>) (Fig. 9). The questionnaire was formulated and validated in collaboration with 2 experts in the field. The link to the survey was circulated to the intended participants who were randomly selected from the pool of dentists and dental students in Mumbai city via email, WhatsApp® and hosted on the Facebook® page of the authors. Simple random sampling was used for the same. The various questions in the questionnaire were broadly categorized into three parts.

1. This part had six questions (1 to 6) related to the age, sex, number of years in practice, the number of days per week and the number of hours per day of practice and if the respondent took a break in between patients.
2. This part (7 to 10) had four questions related to the performance of physical activity, its nature and frequency in days per week and hours per day respectively.
3. The final part of the questionnaire (11 and 12) had two questions regarding the prevalence of musculoskeletal pain in the past 24 months and if it was severe enough to prevent the dentist from working at least temporarily.

The questionnaire was kept live for a period of six weeks and the individuals were reminded to fill it up by a weekly email, WhatsApp® message or Facebook® message.

2.1 Data Processing and Statistical Analysis

Data were analyzed using SPSS® version 23 and conclusions were drawn after analysis of the data. For the independent variables, which were categorical, Chi-square test was performed. A P value of <0.05 was considered to be significant for all analyses.

3. RESULTS

The response rate in the study was 85.83% (out of 600 intended participants 515 completed the survey). The average age of the respondents was 36.32±10.92 (SD) years. The number of males was 178 (34.56%) while the number of females was 337 (65.44%). The majority of the respondents had between 0-5 years of practice (36%), followed by more than 20 years of practice (24.1%). While practicing for 6-7 days per week (63.9%) was most common and was followed by 3-5 days a week (35.7%). Practicing for 4-7 hours per day (63.4%) was followed by practicing for 8-12 hours a day (32.3%). 78.82% (402) dentists and dental students took a break during their working hours.

Only 26.21% of the respondents performed some kind of physical activity. The most common physical activity performed was walking for more than 30 minutes per day (42.3%) followed by yoga (22%) and going to the gym (20.8%). The majority of the respondents performed physical activity for an hour or less per day (69.2%)

followed by 1-2 hours per day (29.1%), with a frequency of 3-5 days per week (49.7%) followed by 1-2 days per week (28.1%).

A total of 83.10% of the dentist suffered some form of musculoskeletal pain in the last two years with 20.79% of them reporting the pain to be severe enough for them to discontinue the practice of dentistry at least temporarily.

The results have been summarized in Tables 1, 2 and 3.

Table 1. Work characteristics of respondents

Characteristic	Number	Percentage
Work characteristics		
a. Response rate	515/600	85.83
b. Average age	36.32±10.92	
c. Gender distribution		
Males	178	35.56
Females	337	65.44
d. Years of practice		
0-5 years	185	36
5-10 years	81	15.8
10-15 years	74	14.4
15-20 years	49	9.5
20 and above	124	24.1
e. Number of working days per week		
1-2 days	3	0.58
3-5 days	184	35.72
6-7 days	328	63.68
f. Hours of practice per day		
1-3 hours	18	3.5
4-7 hours	330	64.07
8-12 hours	165	32.03
12 and above	2	0.38
g. Break between patients		
Yes	401	78.82
No	114	21.18

4. DISCUSSION

Most of the studies like the present one investigating various aspects of musculoskeletal pain in dentists are observational in nature. Though these questionnaire based studies have their own limitations, their usefulness in determining clinical features of the participants and the prevalence of a disorder, and in recommending preventive strategies cannot be questioned [11].

Table 2. Physical activity amongst respondents

Characteristic physical activity	Number	Percentage
a. Respondents performing physical activity	135	26.21
b. Physical activity type		
Cycling	4	2.96
Swimming	10	7.4
Jogging	6	4.44
Aerobics	9	6.66
Yoga	22	16.29
Walking for at least 30 minutes per day	47	34.81
Gym	23	17.03
Others	14	10.37
c. Frequency per week		
1-2 days	36	26.66
3-5 days	69	51.11
6-7 days	30	22.22
d. Duration per day		
0-1 hour	89	65.92
1-2 hours	44	32.59
2-3 hours	1	0.74
3 and above	1	0.74

Table 3. Musculoskeletal pain amongst respondents

Characteristic Musculoskeletal pain	Number	Percentage
a. Respondents with musculoskeletal pain in the past 2 years	428	83.1
b. Pain severe enough to at least stop working temporarily	89	20.79

There are different methods that have been utilized for reporting the prevalence of musculoskeletal pain in dentists namely clinical examination, interview and self-reporting (the method used in the present study). It has been reported that all the methods give apparently similar results [12,13].

In the current study, the prevalence of musculoskeletal pain in the last two years was found to be 83.10%. This is higher than the 71% prevalence of musculoskeletal pain reported by Taje Tamo et al. [14] in a study carried out on

the dentists working in North East India. The higher prevalence rate in the present study can be accounted for by the enquiry of the duration of the musculoskeletal pain, which was 2 years in the present study as compared to 1 year enquired for in the study by Taje Tamo et al. [14]. The prevalence rate was similar to that reported by Yi J et al. [15] in Chinese dentists. It was higher in the present study than reported in Israel by Ratzon et al. [16] and in Denmark by Finsen et al. [17] but it is lower than that reported in a recent study conducted by Hodacova et al. [18] on Czech dentists in 2015. The high prevalence of musculoskeletal pain in dentists can be attributed to a high level of precision demanded by the profession which leads to awkward positions being assumed by the dentist often leading to hyperextension of the neck, twisting of the spine and unsupported elevated hands for a prolonged period of time, all of which can lead to musculoskeletal pain.

The prevalence of musculoskeletal pain was lower in the 2nd decade of life of the dental health care professionals while it remained almost constant in the 3rd, 4th and the 5th decades, before increasing in the 6th decade of life (Fig. 1). There is considerable controversy regarding age and the prevalence of musculoskeletal disorders. Studies have reported that the prevalence of musculoskeletal pain peaks in the 6th decade [19,20] while Lehto et al. [21] reported that pain remains constant with age. Rundcrantz et al. [22] has reported that younger dentists suffer more from musculoskeletal pain.

The prevalence of musculoskeletal pain was slightly lower for dentists working for 0-5 years (77.54%) but remained almost constant in dentists practicing for 5-10 years (85.18%), 10-15 years (87.83%), 15-20 years (89.79%) and 20 and above years (84.67%) (Fig. 3). This is in contrast to a similar study done on Polish dentists by Hille et al. [23] in 2015 which reported an increase in musculoskeletal pain with the increase in years of practice. The prevalence of musculoskeletal pain increased with the number of days a dentist practiced, with the dentists practicing for 1-2 days per week reporting a prevalence of 33%, dentists practicing 3-5 days per week reporting a prevalence of 79.89% and the dentists working for 6-7 days per week reporting a prevalence of 85.06% (Fig. 4).

The prevalence of musculoskeletal pain was significantly lower for dentists practicing for 1-3

hours every day (61.11%) but remained almost constant in the 4-7 hours per day (84.54%) and the 8-12 hours per day (83.63%) groups, before increasing in the 12 hours and beyond group (100%) (Fig. 5). This fact can be explained by the cumulative effect of improper posture with the increase in working hours. This is one aspect which has not been enquired about in other similar studies done outside India as there are legislations regarding the number of hours of work.

The need for frequent short breaks during the course of practice in the day has been stressed on by many studies [24-26] and in the present

study it was found that there was a significant difference in the prevalence of musculoskeletal pain in dentists and dental students who took a break during the day as compared to those who did not (92.92% prevalence of musculoskeletal pain in respondents who did not take a break, compared to 80.34% amongst those who did) (Fig. 2).

The prevalence of musculoskeletal disorders was similar in males and females (83.70% in males and 82.78% in females) which is similar to a study by Newell and Kumar [27] but is in contrast to what has been reported in studies with a similar design where females have a higher

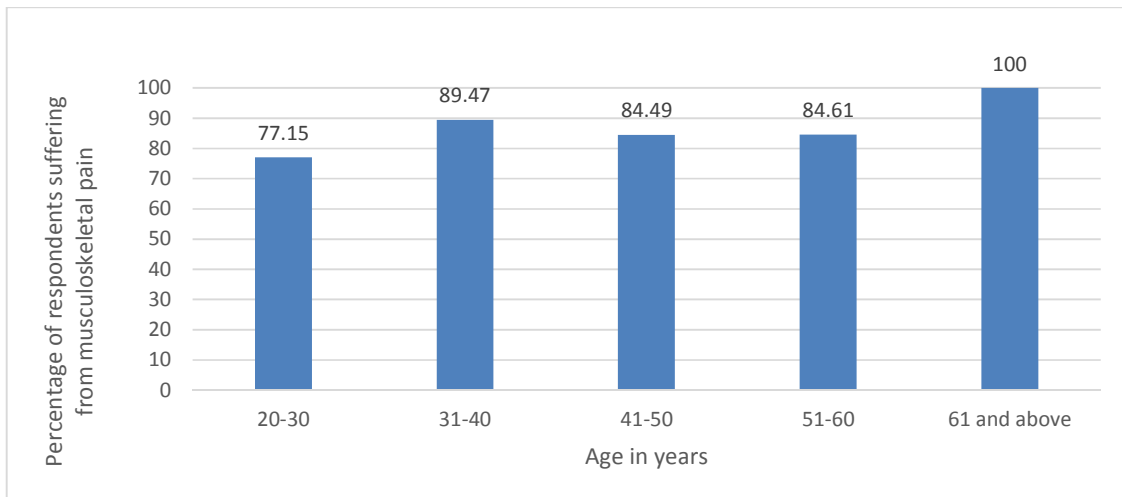


Fig. 1. Age wise prevalence of musculoskeletal pain

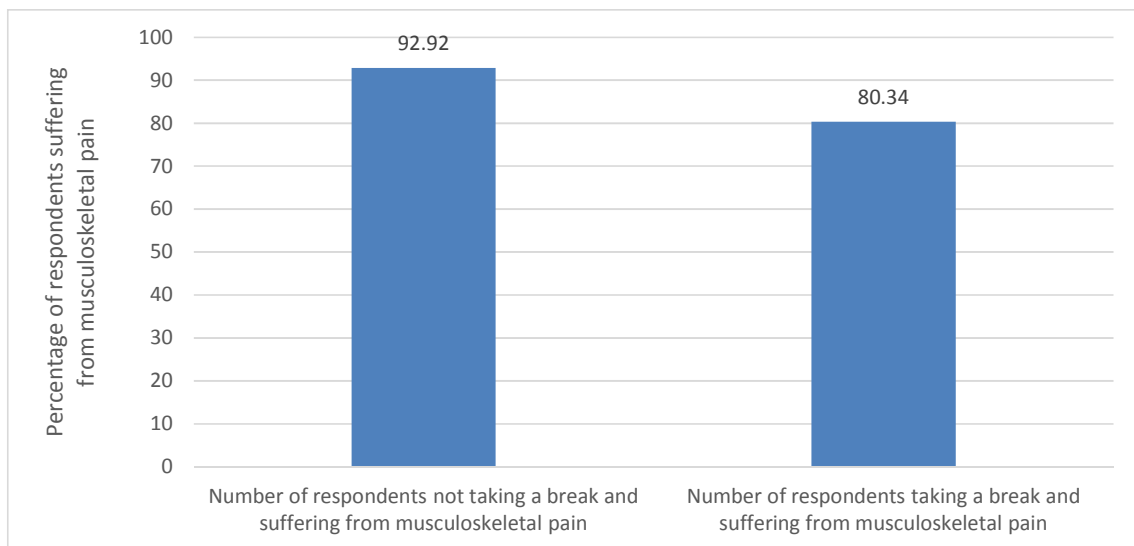


Fig. 2. Break wise prevalence of musculoskeletal pain

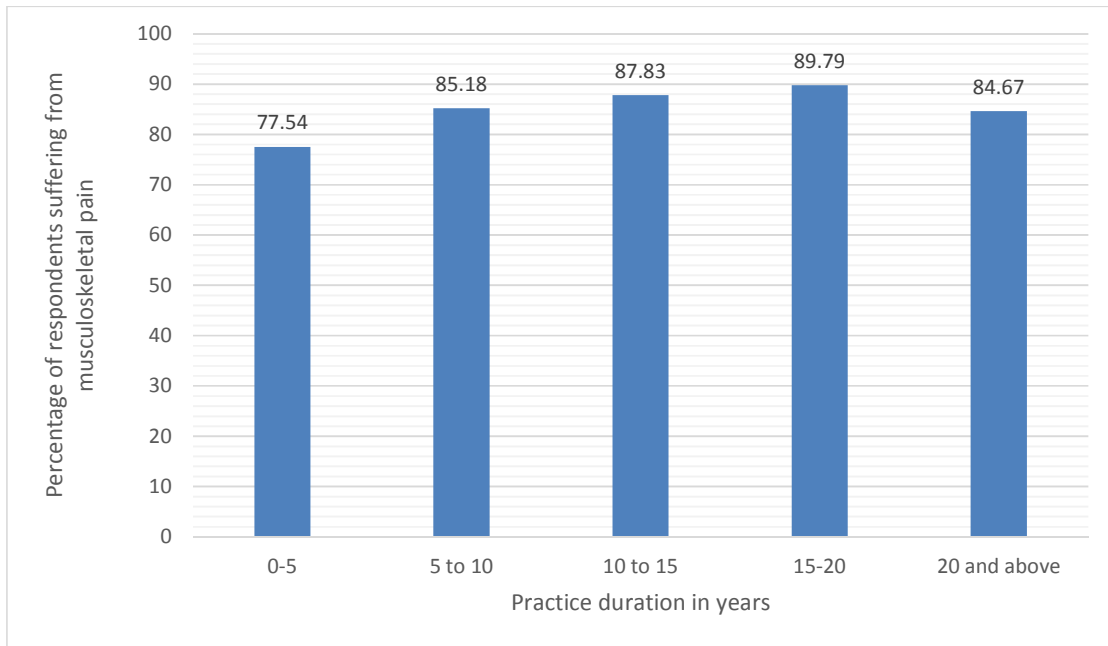


Fig. 3. Years of practice-wise prevalence of musculoskeletal pain

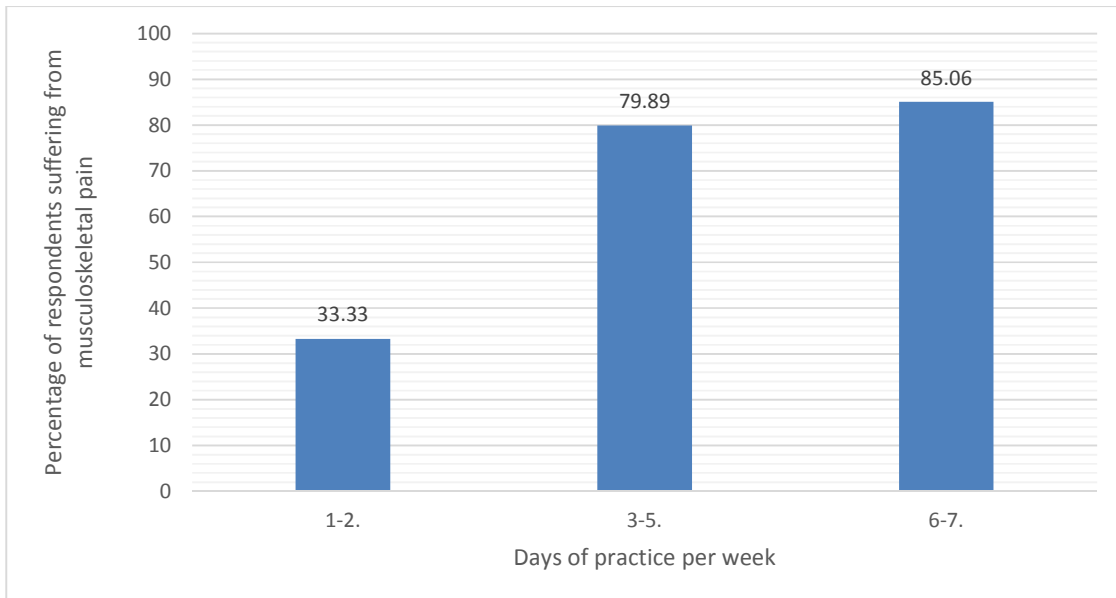


Fig. 4. Days of practice per week wise prevalence of musculoskeletal pain

prevalence of musculoskeletal pain [28,16]. It is also in contrast to another study which reported males to have a higher prevalence of musculoskeletal pain [29]. However, in the present study, the percentage of males who had severe enough musculoskeletal pain to stop working at least temporarily were double that of females (30.20% males and 15.77% females).

The usefulness of physical activity cannot be over-emphasized in the professional practice of dentistry. An excellent article by B Valachi et al. [28] about the prevention of MSD in dentistry exists in literature. There was a very strong positive correlation between the prevalence of musculoskeletal pain in dentists who did any sort of physical activity (52.59%) as compared to

those who did not indulge in any sort of physical activity (93.94%) (Fig. 6) (r value= 0.893). It was observed that there was a definite direct correlation between the frequency of physical

activity per week and musculoskeletal pain (74.35% participants indulging in physical activity 1-2 days a week suffered from musculoskeletal pain while the percentage of participants who

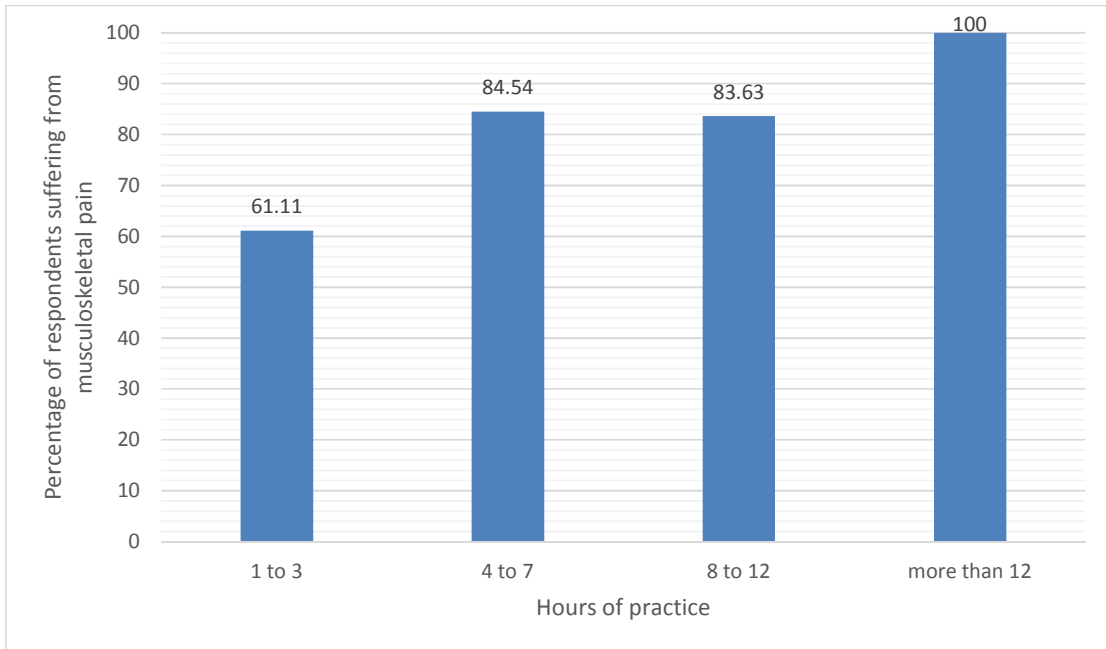


Fig. 5. Hours of practice per day wise prevalence of musculoskeletal pain

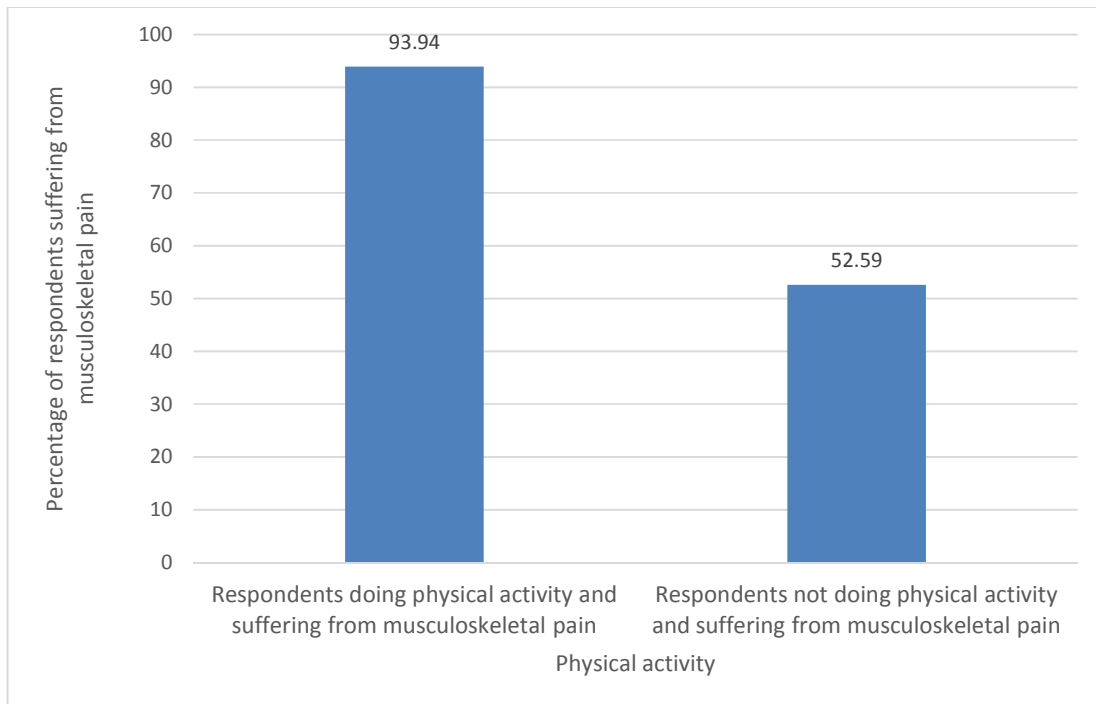


Fig. 6. Physical activity wise distribution of musculoskeletal pain

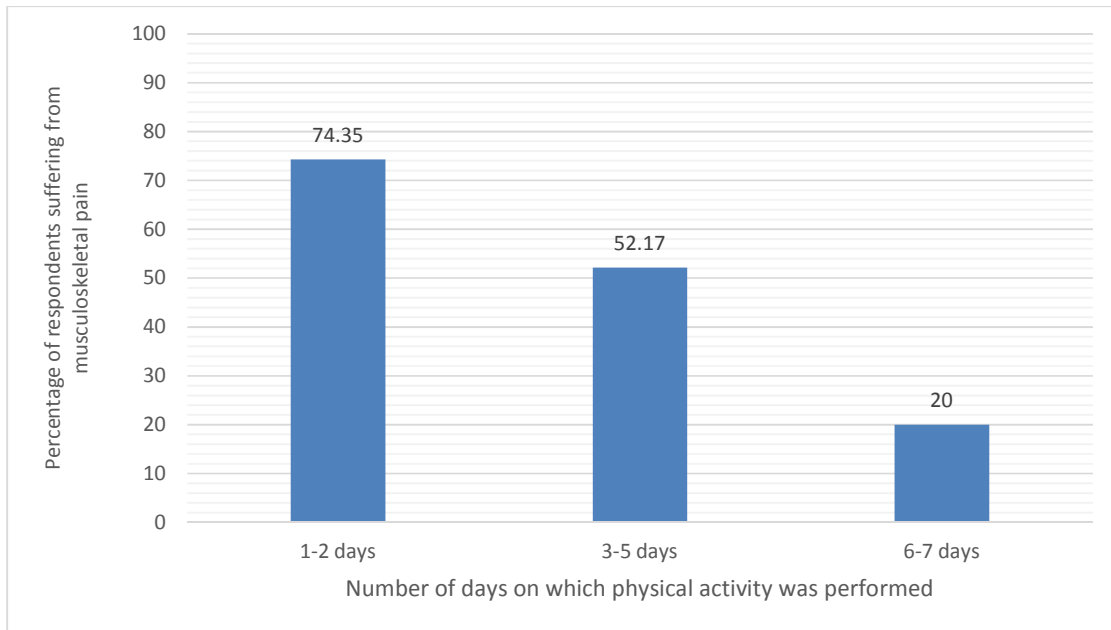


Fig. 7. Days of physical activity wise break of musculoskeletal pain

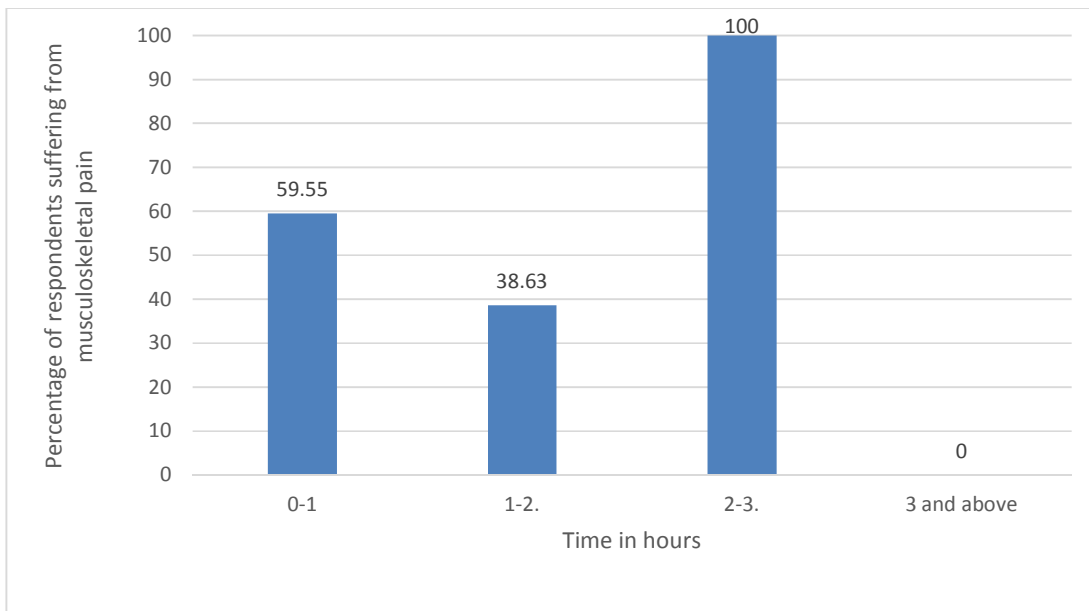


Fig. 8. Hours of physical activity wise prevalence of musculoskeletal pain

suffered from musculoskeletal pain in the group which indulged in physical activity for 3 to 5 days was 52.17% and in the group which indulged in physical activity for 6-7 days was 20% (Fig. 7) (r value= 0.374). However no such correlation could be established between the number of hours each day of physical activity and musculoskeletal pain (Fig. 8). Similar results

were obtained by Sharma and Goulcha in a study conducted in 2010 [30].

A similar percentage of males and females performed physical activity (26.40% males and 26.11% females) and walking for more than half an hour was the most common physical activity performed in both sexes.

Physical Fitness Amongst Dental students and dentist

1. Age
2. Sex
Male
Female
3. Since how many years have you been practicing dentistry?
0-5
5-10
10-15
15-20
more than 20
4. How many days per week do you practice?
1-2
3-5
6-7
5. How many hours per day do you practice?
1-3
4-7
8-12
more than 12
6. Do you take a break in between patients?
Yes
No
7. Do you perform any physical activity?
(IF YOUR RESPONSE IS NO, PLEASE PROCEED TO QUESTION 11 DIRECTLY)
Yes
No
8. Which of the below mentioned physical activities do you perform?
Cycling
Swimming
Jogging
Aerobics
Yoga
Walking (More than 30 minutes/day)
Gyming
Other:
9. How many days per week do you perform these physical activities?
1-2
3-5
6-7
10. How many hours per day do you perform these physical activities?
0-1
1-2
2-3
3 and above
11. Have you experienced any musculoskeletal pain in the past 2 years?
Yes
No
12. Has the musculoskeletal pain been severe enough to interrupt or prevent you from practicing dentistry at least temporarily?
Yes
No

Fig. 9. The questionnaire for the respondents

5. CONCLUSION

The limitations of the study were

1. The cross-sectional nature of the study.
2. Recall bias of a questionnaire based study
3. Unequal gender distribution.
4. Average age of the present study being less than the national average age of dentist population.

The present study gives an insight into the very high prevalence of musculoskeletal pain in the dentists and dental student population of Mumbai city, which is similar to the prevalence rate

elsewhere in the country and the world alike. The study also points out to the lack of physical activity in the dental fraternity, while highlighting its positive impact on musculoskeletal pain. Formal teaching of ergonomics early in the course of the dental curriculum in the country along with stress being laid upon the importance of physical activity for ensuring a pain-free professional career for the dental health care personnel should be considered.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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