

Research Article

Musculoskeletal disorders and ergonomic interventions among postgraduates, academic endodontists in the department of endodontics in dental colleges and consulting endodontists in Hyderabad, Telangana State, India.

¹Dr.M.S.Ranga Reddy M.D.S, ²Dr.P.Karunakar M.D.S, ³Dr.M.Daneswari M.D.S, ⁴ Dr.Rashmi Pratap M.D.S

¹ Professor, Department of Conservative Dentistry and Endodontics, Pnineeya Dental College, Hyderabad.

² Professor & HOD, Department of Conservative Dentistry and Endodontics, Pnineeya Dental College, Hyderabad.

³ Professor, Department of Pedodontics and Preventive Dentistry, Mamata Dental College, Khammam

⁴ Post graduate student, Department of Conservative Dentistry and Endodontics, Panineeya Dental College, Hyderabad.

Received 08 Oct. 2017; Accepted 02 Nov. 2017

ABSTRACT

Back ground: Musculoskeletal disorders (MSD) represent an important occupational health issue in dentistry.

Aim: To investigate the prevalence, impact of MSD and its prevention among post graduate students, academic endodontists faculty in the department of conservative dentistry and endodontics in dental colleges and consulting endodontists in Hyderabad, Telangana state.

Materials and Methods: A questionnaire survey about musculoskeletal pain in different parts of the body was completed by post graduate students, academic endodontists faculty in the department of conservative dentistry and endodontics in the dental colleges and consulting endodontists in Hyderabad. The descriptive data was analysed using Statistical Package of Social Science (SPSS) software 18.0 version.

Results: The most prevalent musculoskeletal complaints were reported at the back (85.7%) followed by pain in the wrist/hand(80%).There was also an association between years of experience, duration of break during work and use of protective equipment with the prevalence of musculoskeletal pain among respondents.

Conclusion: The study results suggest that effective intervention strategies most likely have to take into account both ergonomic improvements and cognitive-behavioural aspects.

Keywords: Musculoskeletal disorders, endodontist, ergonomics in dentistry

INTRODUCTION

Work-related musculoskeletal disorders (MSD) are one of the most prevailing occupational health problems in health care workers. MSD are identified as injuries to the human support system of the muscles, ligaments, tendons, nerves, blood vessels, bones and joints, and can occur from a single event or cumulative trauma. [1]

A significant body of research has identified that dental professionals in particular are at an increased risk of MSD, with the prevalence rates reported at between 64% and 93%. [2] In dentists, overstrained and awkward back postures for back pain, repetitiveness for neck and shoulder

disorders, and psychosocial stressors for back, neck and shoulder complaints. [3] This negatively impacts on productivity and job satisfaction leading to dental professionals considering alternate careers. [4] It is essential that predictors of MSD are carefully investigated, so that preventive strategies and interventions can be appropriately targeted. Ergonomic interventions may have a greater impact in prevention of these disorders.

There is limited data previously investigating the association of MSD with work exposure patterns and on the role of physical activity which includes posture correction, ergonomic advice, use of magnifying loupes and stretching exercises among Indian endodontists. The purpose of this present

survey was to evaluate the musculoskeletal problems from the aspect of ergonomics and its prevention among post graduate students ,academic endodontists faculty in the department of conservative dentistry and endodontics in dental colleges and consulting endodontists in Hyderabad, Telangana state.

Materials and Methods

A descriptive cross-sectional study was conducted among 200 participants which included post graduate students, academic endodontists faculty in the department of conservative dentistry and endodontics in all dental colleges in Hyderabad and consulting endodontists in Hyderabad, Telangana state. Participation was completely voluntary and there were no personal identifiers. A close ended questionnaire survey was developed and validated.

The questionnaire consisted of a number of tick-box style questions and two short answer responses, covering anthropometric data, clinical practice data, specific dental procedures, musculoskeletal symptoms and ergonomic education. In the first section the age, education (post graduate students/academic endodontists /consulting endodontists), height, weight for body mass index were recorded. The second section of the survey includes the clinical practice factors specific to post graduate students ,faculty members in the department of conservative dentistry and endodontics in all dental colleges and consulting endodontists which were the number of days worked per week, the number of hours worked per week, the number of patients seen per day ,work time spent for each patient performing treatment, the number of minutes break in between appointments, the number of minutes with each patient in awkward working postures in which the back is bent or twisted, and the cumulative work hours. The procedural questions included were the work time spent

performing certain procedures using hand files, rotary and magnification loupes. The third section of the survey consisted of questions about work-related musculoskeletal disorders in the past 12 months and was a modification of the standardized Nordic questionnaire. Anatomical diagram was used to assist the participants to clearly identify body regions for the job related ache, pain, discomfort or other complaint. The last section of the survey was the physical therapy and ergonomic education. The preventive procedures included were the stretching, posture improvement, reducing working hours, altering work schedule, yoga, medication, finger rest and use of advanced instruments like magnification loupes. Survey data was computed and descriptive statistics was performed The data was analysed using Statistical Package of Social Science (SPSS) software 18.0 version.

Results:

The demographic data of study population consisted predominantly of qualified MDS (65.5%). When the number of years in practice was considered (24%) of the endodontists had more than 16 years.10% of dentists were calculated as obese (Table 1).

The presence of self-reported risk factors for musculoskeletal complaints were reported (Table 2).The post graduates, academic endodontists faculty members in department of endodontics and consulting endodontists in this study treated an average of 5 patients a day and spent for each patient was on an average of 30 minutes. Working in awkward positions, insufficient breaks during the day and use of instruments were the other factors rated greater than 5 out of 10.The most prevalent work-related musculoskeletal disorders were reported at the back (85.5%) (Table 3). Self –perceived health and ergonomics reported endodontists performing stretching (68%)and use of magnification loupes(48%)(Table 4).

Table 1: Descriptive statistics on demographic data

Demographics	%
Qualification:	
Endodontist (faculty/consulting)	65.5
Post graduate students	34.5
Years of Practice:	
3-10 years	56
10-15 years	20
≥ 16 years	24
BMI:	
< 20 kg/m ² (underweight)	15
20 - 24.9 kg/m ² (normal)	56.5
25 - 29.9 kg/m ² (overweight)	18.5
≥ 30 kg/m ² (obese)	10

Table 2: Descriptive statistics on work exposure patterns

	<u>Median</u>	<u>Range</u>
Days/week	4 days	1-5 days
Hours/day	7 hours	3-15 hours
Patients/day	5 patients	3-15 patients
Minutes with each patient	45 minutes	15-70 minutes
Minutes in between patients	10 minutes	1-45 minutes
Minutes in twisted, rotated position with each patient	25 minutes	1-50 minutes
Minutes bent forward with each patient	20 minutes	0-50 minutes
Cumulative Work Hours	6 hours	1– 10.3 hours
Tools used with patients:		
Handpiece (patients/day)	10 patients	1-20 patients
Hand Files (patients/day)	5 patients	1-15 patients
Rotary files(patients/day)	10 patients	1-12 patients
Magnification (patients/day)	6 patients	1-10 patients

Table 3: Description on MSD site distribution

Body Part	%
Neck	40.6
Shoulder	50.9
Elbow	20.8
Forearm	34.3
Back	85.7
Wrist/Hand	80.0
Knee	24.1
Ankle	22.4

Table 4: Description of physical activity practices

Preventive Measures	%
Stretching	68.6
Improved posture	71.4
Lumbar or chair supports	9.8
Workstation adjustment	22.0
More frequent breaks	10.6
Reduced working hours	17.1
Altering work schedule	8.2
Ergonomic instruments	23.3
Yoga	22.0
Prescription medication	14.7
Finger rest (not prescribed)	15.1
Magnification(patients/day)	48

Discussion:

Occupational diseases are not only physical, psychological and social disease, but also have economic and security impacts when they reach a

level of severity that directly affects working capacity, leading to absences and early retirement. [5] It is generally agreed that the physical posture of the doctor while providing

care, should be such that all muscles are in a relaxed, well-balanced and neutral position. Postures outside of this neutral position for a prolonged period are likely to cause musculoskeletal discomfort. [6] It is therefore important to increase health knowledge on occupational hazards and also emphasize the importance of early diagnosis and treatment for these disorders. Till date no data on work related musculoskeletal pain and ergonomic interventions was recorded among post graduate students, academic endodontists who are only faculty members in the department of conservative dentistry and endodontics in dental colleges and consulting endodontists in Hyderabad, Telangana state. Hence, the purpose of present study was to evaluate these parameters. This present study includes 200 participants who are post graduate students, teaching faculty members in department of endodontics in the dental colleges and consulting endodontists in Hyderabad.

The questionnaire used in the present study was in accordance with a study which adapted a version recently used in among health care workers and health science students.[7] In dental profession, dentists frequently assume many awkward and unfavourable postures because of performing some extremely precise procedures in a limited work space i.e. in oral cavity.[8] Compared to general dental practitioners and other fields of dentistry, high prevalence of MSDs were reported in dentists belonging to the field of operative dentistry. This finding is not consistent with the studies conducted by Yi et al who reported high prevalence of MSDs in periodontists and Alghadir et al. who reported high prevalence among paediatric dentists.[9,10] The probable reason for these findings could be that in our study sample, there was no dentist who belonged to any of these two specialties.

In our cross-sectional study, qualification and work experience revealed that qualified M.D.S (teaching/consultants)(65%) , with <5 years of professional experience have greater prevalence of MSDs, which is in accordance with the findings of Zarra et al. This may be because of complex

body postures during dental treatment, unorganized working conditions in the majority of clinics and excess working hours without intermittent rest periods, poor ergonomics maintained in dentistry, inability to perform '6 Hand Dentistry', inadequate operator light, inadequate magnification and limited accessibility to the operating area. These postures alone or in combination with high precision forces during instrumentation play an important factor. [11,12,13]

For each musculoskeletal pain at least one physical risk factor was significantly important. This pain can be attributed to numerous risk factors, including prolonged static postures, repetitive movements, suboptimal lighting, poor positioning, genetic predisposition, mental stress, physical conditioning, age and obesity. Educational levels, working without breaks and awkward position were significant factors for shoulder pain. Height remained significant factor for hand/wrist complaints.[14] Overweight and obesity were found to be an significant risk factors for musculoskeletal pain. In our present study, body mass index (BMI)(25-29,9%) was recorded with 18.5% dentists suffered MSD. Subjects with body mass index (BMI) >24.9 suffered from MSD pain 1.7 times more than subjects with BMI <24.9.[15]

The present study found an association between the number of hours on an average, the number of patients attended, duration of break during work, type of working posture, type of instruments and use of protective equipment with the prevalence of musculoskeletal pain. Most of the participants in the present study reported 85.7% occupational back pain. This were significantly noted in the endodontists working for 3-15 hours per day on an average. Supporting this, a Polish study found that the most reported musculoskeletal problem was in the thoracic lumbar region at 60.1%. A systematic review conducted by Hayes et al demonstrated that musculoskeletal disorders represent significant burden for the dental profession and reported high prevalence of musculoskeletal problems in upper extremities of the body.[2] Neck and lower back were the most commonly affected sites of

MSD in physicians (40% and 50% respectively) and dentists (40% and 50% respectively) whereas hips, elbows and knees were the least commonly affected. This may be due to bending of their neck and back by dentists, especially while treating maxillary teeth.[16] It is also not unexpected that we identified a correlation between increased working hours and wrist pain. This was significantly noted in the endodontists working for 3-15 hours per day on an average. These findings were in correlation with Liss et al and Shenkar et al.[7] Carpel tunnel syndrome is a specific musculoskeletal problem, which has also been investigated in dental professionals. Our current study also examined prevalence of shoulder pain (50.9%) which was in accordance to study from Sweden which explained that dentists were exposed to a high load on the trapezius muscles bilaterally, as well as prolonged forward bending of the head.[17] We observed in our present study that performing regular specific exercises, in any form was found to be helpful in decreasing MSD in all participants. Ergonomically designed dental instruments (23.3%) and magnifying loupes (48%) had significant effects on hand muscle load and pinch force. Reasons may be multi-factorial like an increase in body threshold for pain, decrease in stress and anxiety levels with regular physical activity. This is a proven fact, especially with Yoga activity(22%), improving physical and psychological elements(stretching, work station adjustments, lumbar supports) varied from 68.6% to 9.8% respectively thereby minimizing musculoskeletal pain in doctors.[18]

Prevention of these disorders is becoming crucial and requires the identification and modification of risk factors such as stature, physical condition, and awkward postures, intense work schedules strength, work organization, ergonomic hazards and factors associated with professional equipment may also contribute. Detailed studies between doctors of different specialties are needed, to arrive at more specific understanding to plan better preventive methods.

References

- Graham C. Ergonomics in dentistry, Part 1. Dent Today 2002;21(4):98-103.
- Hayes MJ, Cockrell D, Smith DR. A systematic review of musculoskeletal disorders among dental professionals. Int J Dent Hygiene 2009; 7:159-65.
- Alexopoulos EC, Stathi I-C, Charizani F. Prevalence of musculoskeletal disorders in dentists. BMC Musculoskeletal Disorders 2004;5:16.
- Anton D, Rosecrance J, Merlino L, Cook T. Prevalence of musculoskeletal symptoms and carpal tunnel syndrome among dental hygienists. Am J Ind Med 2002; 42:248-57.
- Fulton-Kehoe D, Franklin G, Weaver M, Cheadle A. Years of productivity lost among injured workers in Washington State: Modeling disability burden in workers' compensation. Am J Ind Med. 2000;37:656-62.
- Luxembourg: European Communities; 2004. European Communities Work and health in the EU, a statistical portrait.
- Hayes MJ, Taylor JA, Smith DR. Predictors of work-related musculoskeletal disorders among dental hygienists. Int J Dent Hygiene 2012;10(40):265-9.
- Hameed MH, Ghafoor R, Khan FZ, Bada SB. Prevalence of musculoskeletal disorders among dentists in teaching hospitals in Karachi. JPMA 2016;66(10):S36-S38.
- Yi J, Hu X, Yan B, Zheng W, Li Y, Zhao Z. High and specialty-related musculoskeletal disorders afflict dental professionals even since early training years. J Appl Oral Sci 2013;21:376-82.
- Alghadir A, Zafar H, Iqbal ZA. Work-related musculoskeletal disorders among dental professionals in Saudi Arabia. J Phys Ther Sci 2015;27:1107-12.
- Kar SK, Dhara PC. An evaluation of musculoskeletal disorder and socioeconomic status of farmers in West Bengal, India. Nepal Med Coll J 2007;9:245-9.
- Kumar VK, Kumar SP, Baliga MR. Prevalence of work-related musculoskeletal complaints among dentists in India: A national cross-sectional survey. Indian J Dent Res. 2013; 24: 428-38.
- Zarra T, Lambrianidis T. Musculoskeletal disorders amongst Greek endodontists: a

- national questionnaire survey. *Int Endod J* 2014;47(8):791-801.
14. Smith DR, Wei N, Zhang YJ, Wang RS. Musculoskeletal complaints and psychosocial risk factors among physicians in mainland China. *Int J Ind Ergon* 2006;36:599–603
 15. Grotle M, Hagen KB, Natvig B, Dahl FA, Kvien TK. Obesity and osteoarthritis in knee, hip and/or hand: An epidemiological study in the general population with 10 years follow-up. *BMC Musculoskelet Disord*. 2008;9:132.
 16. Rambabu T, Suneetha K. Prevalence of work related musculoskeletal disorders among physicians, surgeons and dentists: A comparative study. *Ann Med Health Sci Res* 2014; 4(4): 578–82.
 17. Akesson I, Hansson GA, Balogh I, Moritz U, Skerfving S. Quantifying work load in neck, shoulders and wrists in female dentists. *Int Arch Occup Environ Health* 1997;69:461-74.
 18. Sharma P, Golchha V. Awareness among Indian dentist regarding the role of physical activity in prevention of work related musculoskeletal disorders. *Indian J Dent Res* 2011;22:381–4