

Ergonomics in Dentistry: Really A Practice or Just a Tactics

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ABSTRACT

Introduction: Work related musculoskeletal disorders are one of the most common health problem among the dentists and the most common reason for early retirement from dentistry because in dentistry, clinically, working field is confined to a very small area (oral cavity). Ergonomics is highly relevant to preventive and occupational medicine, management of musculoskeletal injuries and rehabilitation. The objectives of this study was to assess the knowledge and practice towards Ergonomics and Musculoskeletal Disorders (MSDs) among dental population.

Material and Methods: This was a cross sectional analytical study, conducted among Interns of various dental colleges of Lucknow, U.P. A set of closed ended twelve questions were prepared to collect the relevant information pertaining to this study. Questions were related to assess the knowledge and practice towards ergonomics and work related musculoskeletal disorders. Type of clinical practice, Dentists working position, number of clinical working hours, musculo-skeletal problem, location of pain, were included

Result: The study sample consisted of 225 dental students (195 BDS interns and 30 MDS students) and 56 private practitioners. Majority of subjects i.e. 67.89% students and 74.57% practitioners said that they don't know about ergonomics at all. 75.57% students and 82.13% practitioners accepted that practicing dentistry without ergonomics principles can cause musculoskeletal disorders. Only 55.6% students and only 8.92% practitioners were strictly following the principles of operator's position, patient's position and dental chair's position while treating patients in dental clinic. 60.71% practitioners and 26.67% students had pain in shoulders, back or extremities regularly, 26.78% practitioners and 51.11% students had pain sometimes whereas only 12.7% practitioners and 22.23% students never had pain.

Conclusion: The key for dental clinicians for staying healthy and fit is to adopt an ergonomic position all the times and adopting yoga/exercise in their daily routine thus preventing them from developing MSDs. Faculty in the institutions are required to teach these principles on 'need for dentist's health' basis rather than just as a curriculum since BDS first year so that prevention of MSDs can be implemented at primary level.

Keywords: Ergonomics, Musculoskeletal Disorders

INTRODUCTION

Work related musculoskeletal disorders are one of the most common health problem among the dentists and the most common reason for early retirement from dentistry because in dentistry, clinically, working field is confined to a very small area (oral cavity). Dental work requires very precise force application while delivering oral health. For the same dentist uses a fixed posture that causes occupational hazard for dentist.^{1,2} Moreover, inappropriate operator's position and

patient's position, while treating the patients on dental chair along with prolonged working hours may lead to multiple occupational hazards specially work related Musculo skeletal disorders (MSDs) among dentist population.^{1,2} To overcome this kind of health hazards, dentists and their team should work in an ergonomic environment.

The term ergonomics is derived from "Greek" words "ergon" and "nomos" in which "ergon" means work and "nomos" means natural laws.³ Thus Ergonomics is a study of how the human body can be best used for maximum comfort, efficiency, safety, and productivity.⁴ Ergonomics is highly relevant to preventive and occupational medicine, management of musculoskeletal injuries and rehabilitation. It helps people understand their limitations within the working area and helps them to find out the way to perform safely, effectively, and comfortably within the working environment.³

Every dentist is of different built, and has a different level of strength. Contrary to that most of the workstations, machines, tools and equipment are designed without consideration of ergonomic principles.⁵ This is very important that dentists should know how to consider the ergonomics principles while designing and setting up the dental clinic.

Therefore the objectives of this study was to assess the knowledge and practice towards Ergonomics and Musculoskeletal Disorders (MSDs) among dental population.

MATERIAL AND METHODS

This was a cross sectional analytical study, conducted among Interns of various dental colleges of Lucknow, U.P. A set of closed ended twelve questions were prepared to collect the relevant information pertaining to this study. Questions were related to assess the knowledge and practice towards ergonomics and work related musculo-skeletal disorders. Type of clinical practice, Dentists working position, number of clinical working hours, musculo-skeletal problem, location of pain, were included. Questionnaire was tested for its feasibility; pilot study was conducted and all the

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How to cite this article: Sumit Kumar, Vinay Kumar Gupta, Gaurav Mishra. Ergonomics in dentistry: really a practice or just a tactics. International Journal of Contemporary Medical Research 2019;6(7):G1-G4.

DOI: <http://dx.doi.org/10.21276/ijcmr.2019.6.7.12>

shortcomings had been rectified. Study sample included BDS Interns and MDS students (Dental Students) of dental colleges as well as private dental practitioners of Lucknow city. Inclusion criteria for selecting the subjects for study were; dental students, practicing dentists (practicing duration from 5 to 15 years) with no history of trauma. The total of 250 dental students (interns and MDS students of clinical branches) were contacted to complete the questionnaire during their free hours, out of which, only 225 subjects voluntarily completed the questionnaire. 75 dental practitioners were contacted out of which 56 practitioners completed the questionnaire. The questionnaire was distributed to the interns during their relatively free time of clinical posting in respective departments and they were asked to fill it out in fifteen minutes without discussing to one another. Informed consent was taken from the participants after explaining them about the aim and objectives of the study and confidentiality was assured. Ethical approval for the study was taken from the institutional ethical committee

of KGMU.

All the questions were objective in nature with three options. The validity of the questionnaire was assessed with Cronbach's alpha internal consistency coefficient. Data was analysed using Microsoft Office Excel 2016 and the results were expressed in percentage.

RESULTS

Total of 281 subjects completed the survey. The study sample consisted of 225 dental students (195 BDS interns and 30 MDS students) and 56 private practitioners. All the subjects were in the age range of 18 to 40 years in which 207 were females and 74 were males. In response to the question, whether they were taught about ergonomics principles during BDS course 42.34% dental students and 39.28% practitioners said that they were taught to some extent but 57.66% students and 60.72% practitioners said that they were not taught at all. Not even a single subject answered that they were taught about ergonomics properly during BDS

Questions	Answers	
	Students	Private practitioners
1. Was Ergonomic Principles taught to you during BDS course?	Yes- 0 To some extent – 96 Not at all - 129	Yes- 0 To some extent – 22 Not at all - 34
2. Do you know the role of Ergonomic Principles in Dental practice?	Yes- 72 No - 153	Yes- 14 No - 42
3. Would you/did you consider the ergonomic principles during setup of your dental office?	Yes-75 No – 150	Yes- 32 No – 24
4. Do you think, practicing clinical dentistry without ergonomic principle can cause Musculoskeletal Disorders?	Yes- 170 No – 55	Yes- 46 No - 10
5. What kind of dentistry you practice?	Standing- 27 Sitting - 40 Both- 158	Standing- 7 Sitting - 16 Both- 33
6. Do you PROPERLY FOLLOW the principles of operator's position, Patient's position and dental chair position for treating the patients in dental office?	Yes properly - 125 To some extent-100	Yes properly -5 To some extent-51
7. Do you have pain in your shoulders, back or extremities very often or regularly?	Regularly-60 Sometimes- 115 Never- 50	Regularly-34 Sometimes- 15 Never-7
8. If yes, what is the most common location for pain?	Cervical/neck- 85 Lumber/lower back-35 Thoracic-10 Extremities-45	Cervical/neck- 26 Lumber/lower back- 11 Thoracic-6 Extremities-6
9. If yes, when did you have it first time?	During BDS Course-140 Before Joining BDS course-20 After passing out- NA	During BDS Course-25 Before Joining BDS course-6 After passing out- 18
10. Do you think, your back pain is because of improper posture and non-ergonomically designed equipments?	Yes strictly –67 To some extent-98 I don't know-10	Yes strictly –23 To some extent-17 I don't know-09
11. Do you do regular exercise or Yoga to combat/prevent Musculoskeletal Disorder(s)?	Regularly-37 Sometimes- 68 Never-113	Regularly-11 Sometimes- 29 Never-16
12. Have you taken the medical advice for Musculoskeletal Disorder(s) you have?	Consulted physician- 18 Internet-117 Never- 40	Consulted physician- 5 Internet-27 Never- 17

Table-1: Answers of various questions used in study

course.

Majority of subjects i.e. 67.89% students and 74.57% practitioners said that they don't know about ergonomics at all. 33.19% students were willing to consider the ergonomics principle during setup of their dental clinic, whereas only 57.85% private practitioners properly considered the ergonomics principle during dental clinic setup. 75.57% students and 82.13% practitioners accepted that practicing dentistry without ergonomics principles can cause musculoskeletal disorders. 12% students and practitioners were practicing only standing dentistry. 27.77% students and 17.85% practitioners were practicing dentistry in only sitting posture whereas 70.23% students and 60.43% practitioners practiced dentistry in combination of sitting and standing postures. Only 55.6% students and only 8.92% practitioners were strictly following the principles of operator's position, patient's position and dental chair's position while treating patients in dental clinic whereas 44.44% students and 91.07% practitioners were following this to some extent only.

In response to the questions related to MSDs, 60.71% practitioners and 26.67% students had pain in shoulders, back or extremities regularly, 26.78% practitioners and 51.11% students had pain sometimes whereas only 12.7% practitioners and 22.23% students never had pain. Among subjects who had pain in shoulders, back or extremities, the most common location of pain was cervical region of back (37.77% among students and 46.42% among practitioners) followed by lumber region (15.79% among students and 19.64% among practitioners). Only 10.71% practitioners and 4.44% students had pain in thoracic region. No practitioner but 7.8% students had pain in extremities also. Majority of subjects (62.32% students and 44.64% practitioners) started experiencing pain during BDS course. Whereas only 10.71% practitioners and 8.8% students had pain before joining the BDS course. 32.14% practitioners experienced pain in aforementioned regions while practicing after completing the BDS course. 41.07% practitioners and 29.77% students strictly attributed their MSD symptoms to improper posture and non-ergonomically designed equipment whereas 30.35% practitioners and 43.55% students included some other reasons also. 16.07% practitioners and 4.4% students did not know the reason behind their pain.

Only 19.64% practitioners and 16.44% students were doing regular exercise/yoga to combat/prevent MSDs. 51.78% practitioners and 30.22% students used to do exercise/yoga only sometimes whereas 28.57% practitioners and 50.22% students never practice exercise/yoga to combat/prevent MSDs. Among subjects who had MSD symptoms, only 8% took medical advice from any physician whereas 48.21% practitioners and 52% students never consulted for their MSD symptoms. 30.35% practitioners and 17.77% searched internet for their problem.

DISCUSSION

The common proverb 'Health is wealth' is often forgotten in the process of regular professional activities. Dentistry is a profession where change in natural posture is not

uncommon while working on patients. It is often seen that dentists frequently assume static postures, which require more than 50% of the body's muscles to contract to hold the body motionless during longer breaks^{6,7} which is not good for overall health in turn giving rise to Musculoskeletal disorders. These MSDs are many times a reason behind early retirement from clinical dentistry. In present study majority of the subjects told that they were not taught about ergonomics principles during BDS course. Despite the fact that inculcating the ergonomics principles in the practice of clinical dentistry will reduce the emergence of MSDs this has not been the part of BDS curriculum yet.

Data of the present study revealed that only 11% of subjects were practicing dentistry in exclusively standing posture. The fact is that multiple forces act on the spine while performing work from the surrounding muscles, such as the weight of the body and gravity. The spine is in its natural curved position (S shape) while standing, enabling the body's line of gravity to pass through the trunk and feet, so requiring minimal muscular activity to maintain the posture and to hold the trunk erect.⁸ Sitting with a 90° angle between the trunk and the thighs causes the pelvis to rotate backward shifting the spine away from the line of gravity. This in turn reduces the lumbar lordosis, causing the spine to slump and increasing the loads placed on the spine.⁹ Following the typical principles of operator's position, patient's position and dental chair's position while treating patients in dental clinic can reduce the adverse effects of wrong posture as well as can increase the efficiency of dental work. In present study only 55.6% students and only 8.92% practitioners were strictly following these positioning. The difference in the usage of these principles among students and practitioners might be due to the fact that students in institutional settings are always supervised by faculty which is no more in clinical practitioners

87.49% practitioners and 77.78% students had the symptoms of MSDs which is almost similar to the data found by Sahu D et al (81.06%)¹⁰, Marshal ED et al (82%)¹¹, Aljanakh M et al (77.9%)¹², Maryam Rabiei et al (73%)¹³, whereas it was higher than that found in research of Evangelos CA et al (62%).¹⁴ The prevalence of pain in present study subjects in cervical region/neck was (37.77% among students and 46.42% among practitioners) similar to the findings of Maryam Rabiei et al (43.4% in neck)¹³, Yemineni BC et al (55.5% in neck among practitioners)¹⁵ and Amani Alkhamees et al (49.1% in neck and shoulder)¹⁶ but contrary to the findings of Aljanakh M et al (66% in neck)¹² and Yemineni BC et al (20.1% in neck for interns).¹⁵ The prevalence of pain in present study subjects in lumber region/lower back was 15.79% among students and 19.64% among practitioners which was similar to the finding of Yemineni BC et al (12% in lower back for interns)¹⁵ but different from the findings of Maryam Rabiei et al (35.8% in back)¹³, Aljanakh M et al (73.5% in lower back)¹², Amani Alkhamees et al (61% in lower back)¹⁶, Yemineni BC et al (46% in lower back among practitioners)¹⁵. In present study majority of subjects (62.32% students and 44.64% practitioners) started experiencing pain during BDS course

which was similar to the finding of Evangelos CA et al (57%)¹⁴

41.07% practitioners and 29.77% students strictly attributed their MSD symptoms to improper posture and non-ergonomically designed equipment. Despite the fact that the only way to combat/prevent the MSDs is regular exercise/yoga, only 19.64% practitioners and 16.44% students were doing exercise/yoga regularly which is dissimilar to the findings of Yemineni BC et al for practitioner (31.8%) but similar to their findings for Interns (12.2%).¹⁵ Surprisingly, among subjects who had MSD symptoms, only 8% took medical advice from any physician whereas 48.21% practitioners and 52% students never consulted for their MSD symptoms shows that there is carelessness among young dentists about MSD symptoms which should be given alarming concern.

CONCLUSION

Prevalance of MSDs is not uncommon among dentists and the possible prevention is to use ergonomically designed dental workstations, sitting chairs and equipment. The key for dental clinicians for staying healthy and fit is to adopt an ergonomic position all the times and adopting yoga/exercise in their daily routine thus preventing them from developing MSDs. Faculty in the institutions are required to teach these principles on 'need for dentist's health' basis rather than just as a curriculum since BDS first year so that prevention of MSDs can be implemented at primary level.

REFERENCES

1. Karibasappa G.N, Sujatha Anandan, Rajeshwari K. Dentists' Knowledge, Attitude and Behavior towards the Dental Ergonomics. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) 2014; 13: 5: 86-89.
2. Murphy DC (NYU College of Dentistry, USA). Ergonomics and dentistry. NY State Dent J 1997;63:30-34.
3. Golchha V, Sharma P, Wadhwa J, Yadav D, Paul R. Ergonomic risk factors and their association with musculoskeletal disorders among Indian dentist: a preliminary study using Rapid UpperLimb Assessment. Indian Journal of Dental Research 2014; 25:6.
4. <https://imogenragone.com/ergonomics-for-the-human-body/>
5. Tirthankar Ghosh, Banibrata Das, Somnath Gangopadhyay. Work-related Musculoskeletal Disorder: An Occupational Disorder of the Goldsmiths in India. Indian J Community Med. 2010; 35: 321-325.
6. Garbin AJ1, Garbin CA, Diniz DG, Yarid SD. Dental students' knowledge of ergonomic postural requirements and their application during clinical care. Europ J Dent Educ. 2011;15:31-5.
7. Valachi B1, Valachi K. Mechanisms leading to musculoskeletal disorders in dentistry J Am Dent Assoc. 2003;134:1344-50.
8. Callaghan JP & McGill SM. Low back joint loading and kinematics during standing and unsupported sitting. Ergonomics 2011;44:280-294.
9. Tissot F, Messing K, Stock S. Studying the relationship between low back pain and working postures among

those who stand and those who sit most of the working day. Ergonomics 2009;52:1402-18.

10. Sahu D, Tandon S, Dhingra S, Chinmaya BR, Prasad S, Bali E, et al. Prevalence of musculoskeletal disorders among dentists: A pilot cross-sectional survey. J Indian Assoc Public Health Dent 2015;13:307-12.
11. Marshall ED, Duncombe LM, Robinson RQ, Kilbreath SL Musculoskeletal symptoms in New South Wales dentists. Aust Dent J. 1997;42:240-6
12. Aljanakh M, Shaikh S, Siddiqui AA, Al-Mansour M, Hassan SS. Prevalence of musculoskeletal disorders among dentists in the Hail Region of Saudi Arabia. Ann Saudi Med. 2015;35:456-461.
13. Maryam Rabiei, Maryam Shakiba, Habibolah Dehgan Shahreza, Mohamad Talebzadeh. Musculoskeletal disorders in dentists. International journal of occupational hygiene. IJOH 2012;4:36-40.
14. Evangelos C Alexopoulos, Ioanna-Christina Stathi, Fotini Charizani. Prevalence of musculoskeletal disorders in dentists. BMC Musculoskeletal Disorders 2004, 5:16
15. Bhavan Chand Yemineni, Jaideep Mahendran, Jigeesh Nasina, Jayamathi, Dhanyabhiram. Prevalence of musculoskeletal disorders in dental professionals of Andhra Pradesh, India. International Journal of Contemporary Medical Research 2018;5:C7-C10
16. Amani Alkhamees, Nora Alotaibi, Ramy Elmoazon. Prevalence of musculoskeletal disorders among dentists in Qassim region, Saudi Arabia. International Journal of Medical and Health Research 2018;4:61-66.
17. Shivakumar GC, Sahana S, Sabyasachi Saha. Ergonomics in dental Practice 2018;30.
18. Sakzewski L, NaserudDin. Workrelated musculoskeletal disorders in Australian dentists and orthodontists: Risk assessment and prevention. Work. 2015; 52: 559-579.
19. Kanaparthi A, Kanaparthi R, Boreak N. Postural awareness among dental students in Jizan, Saudi Arabia. J Int Soc Prev Community Dent. 2015;5:107-11.
20. Pirvu C, Pătrașcu I, Pirvu D, Ionescu C. The dentist's operating posture – ergonomic aspects. Journal of Medicine and Life 2014; 7: 2: 177-182.
21. Neha Yadav, Hoti Lal Gupta, Pradeep Kumar, Shradha Sethi, ProbalSoud, Anuja Chandra. Ergonomics: The X-factor for wellness in dentistry. International Journal of Applied Dental Sciences 2015; 1: 4: 128-132.
22. Arpit Gupta, Anil V. Ankola & Mamata Hebbal. Dental Ergonomics to Combat Musculoskeletal Disorders: A Review. International Journal of Occupational Safety and Ergonomics 2013; 19:4, 561-571.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 23-05-2019; **Accepted:** 15-06-2019; **Published:** 16-07-2019