

An Estimation of Awareness among Practicing Dentists about Proper Ergonomic Practice and its Implications in Delhi - National Capital Region

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Abstract

Introduction: Ergonomics is an applied science concerned with designing products and procedures for maximum efficiency and safety. It is a scientific discipline that studies workers and their relationship to their occupational environment. Dentists and dental hygienists are at more risk for developing work related musculoskeletal disorders (MSDs) as compared to general public. The most frequent injuries occur in spine, back, shoulders, elbows, and hands.

Objective: The purpose of this study was to assess the awareness about proper ergonomic practices and its implications among the practicing dentists in Delhi - National Capital Region.

Results: Out of 200 clinicians, 178 clinicians (89%) are aware about ergonomics and its implications in the dental office. The majority of clinicians, 115 (57.5%) sometimes and only 16 (8%) always follow proper ergonomics. Statistically, significant results were found in the level of practice of good ergonomics among aware subjects. Analysis of factors contributing to the development of MSDs was also done.

Conclusion: There is good awareness about ergonomics among dentists, but the incorporation of the same in their practice is average. Several MSDs have been identified caused due to improper ergonomics. All the subjects were suggested to practice better ergonomics along with several exercises to reduce the progression of MSDs.

Key words: Dentistry, Ergonomics, Musculoskeletal disorders, Prolonged static postures

INTRODUCTION

Just over 1 in 4 of today's 20-year-old will become disabled before they retire.¹ While it is easy to imagine a carpenter falling off a roof or a farmer getting caught in a combine. The reality is many work related injuries occur when the worker is simply sitting in an office chair or a dental stool. In Greek, "Ergo" means work and "Nomos" means natural law or systems. Ergonomics, therefore, is an applied science concerned with designing products and procedures for maximum efficiency and safety.² Proper ergonomic design

is necessary to prevent repetitive strain injuries, which can develop over time and lead to long term disability. Ergonomics is concerned with the efficiency of persons in their working environment. It takes account of the worker's capabilities and limitations to ensure that task, equipments, information, and the environment suit each worker.³ Musculoskeletal disorder (MSD) can affect the body's muscle, joints, tendons, ligaments, and nerves. They are caused by work itself or by working environment. It has been noted that back pain is most common followed by neck pain and shoulder pain.⁴ If early signs and symptoms are noted, with the understanding of mechanisms of progression of disease, MSDs can be prevented at a much larger scale. Dental Surgeons are at increased risk of being targeted by the MSDs because of their prolonged working hours and difficult postures. When performing the procedure, dentists try to maintain the neutrality of their posture by exerting undue force on their musculature leading shortening of muscles further progressing to the

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development of MSDs. Their prolonged static postures put them in the dangerous paradox of poor ergonomics which can reflect as chronic low back pain, carpal tunnel syndrome, and cervical spondylitis. Several postures leading to musculoskeletal stresses include:

1. Coordination between the dentist and dental assistant
2. To obtain a clear view of the oral cavity
3. Maneuvering complex armamentarium
4. To provide comfort to the patient during treatment
5. Forceful exertions in tooth extractions
6. Handling of slippery instruments
7. Use of the modified pen grasp in forcefully grasping the instrument with the index finger and the thumb
8. Use of poorly designed small instruments with poor ergonomic grip and blunt edges
9. Prolonged duration of procedures
10. Contact stresses including handling of instruments with narrow grips impinging the bone leading to inflammation and decreased blood flow
11. Psychosocial stresses including time frame crunch and performance anxiety
12. Continuous similar repetitive movements leading to fatigue and stress.

Objective

The purpose of this study was to assess the awareness about proper ergonomic practices and its implications among the practicing dentists in Delhi - National Capital Region (NCR).

METHODOLOGY

200 practicing dentists in the Delhi - NCR area were randomly selected who voluntarily participated in this study. The collected data were received through self-anonymous - administered questionnaires distributed both in hardcopy and *via* emails from the clinicians on their habits and knowledge about ergonomics. The given questionnaire consisted of 20 questions (Appendix 1) with mostly objective type questions for the ease of operation and less time consumption. Statistical analysis was carried out using the Statistical Package for Social Sciences (SPSS), Version 19.0. Armonk, NY: IBM Corp. Chi-square analysis was used to determine significant differences in data with the *P* value set at 0.05.

RESULTS

89% of dentists (178) were aware of proper ergonomics (Table 1), whereas 11% (22) were not aware of ergonomics and its implications in dentistry. 8% (16) claimed that they have never focused on good ergonomics in their practice, and the same amount of dentists claim that they always

follow good ergonomics (Table 2). Statistically, significant results were obtained on analysis of the relationship between subjects aware of ergonomics and their level of practice of ergonomics (Table 3). Analysis of relationship of factors contributing to development of MSDs was done and statistically significant results were obtained with respect to micro breaks in between the procedure, constant vibrations in handpieces, practice four handed dentistry, and the overall physical activity status of the clinician. However, the lighting and temperature of the working are seemed to have no effect in the development of MSDs (Table 4).

DISCUSSION

Dentists are one of the highest potential risk professionals for MSDs. The long working hours, difficult postures and high visual demands make the susceptible to the development of MSDs. In our study, 64.5% of the clinicians

Table 1: Awareness about ergonomics among the subjects

Response	Frequency (%)
Yes	178 (89)
No	22 (11)
Total	200 (100)

Table 2: Level of ergonomic practice among the subjects

Response	Frequency (%)
No response	11 (5.5)
Never	16 (8.0)
Sometimes	115 (57.5)
Every now and then	42 (21)
Always	16 (8.0)
Total	200 (100)

Table 3: Pearson Chi-square ($P \leq 0.05$)

Value	Df	Asymptotic significance (two-sided)
151.570	4	0.000

Table 4: Pearson Chi-square ($P \leq 0.05$)-Dependent Factor

Dependent factors	Value	Df	Asymptotic significance (two-sided)
Micro breaks	63.508	4	0.000
Constant vibrations in handpieces	116.706	4	0.000
Temperature of working area	4.257	4	0.372
Lighting of working area	2.770	4	0.597
Four handed dentistry	108.77	2	0.000
Physical activity status	31.081	4	0.000

have experienced symptoms of MSDs during or after performing dental procedures, these statistics correspond with many other studies done on the subject.⁵⁻⁷ 89% of the subjects showed awareness regarding ergonomics - This was noted as a higher count as compared to the studies done by Kanteshwari *et al.* and Gupta *et al.* which indicated only 50% of the respondents were aware of ergonomics^{8,9} and 59.6% in another study done by Gopinadh *et al.*,¹⁰ however despite 89% awareness about ergonomics, only 8% dentists always follow good ergonomic practices in their work. This means more awareness regarding implications of ergonomics in MSDs is required. Several dependent factors were analyzed and the use of micro breaks proved to be useful in reducing fatigue and further injuring the body. Constant vibrations in the handpiece lead to irritation of nerves leading to carpal tunnel syndrome, harmful effects of these vibrations were noted by Åkesson *et al.* (2000) in their study.¹¹ The practice of four handed dentistry proved to be significant in reducing stress as complimented by Finkbeiner *et al.* (2000, 2001)^{12,13} in their studies. Although in a study done by Shetty *et al.* showed that only 27% of the dentists practiced four handed dentistry.¹⁴ The physical activity status of the clinician certainly is an important factor as it affects the strength, endurance, and overall fitness of the body. Surprisingly, the temperature and lighting of the working area seems to have no effect on symptoms of MSDs among the dentists who participated in this study; the results were nonsignificant. However, Lund¹⁵ stresses on optimum temperature and illumination of the working environment for good ergonomics. According to Gupta *et al.* (2014) MSDs also make the primary retiring factor for dentists (29.5%) followed by cardiovascular diseases, neurotic symptoms, etc.¹⁶

CONCLUSION

The successful application of ergonomics assures high productivity and avoidance of illnesses and injuries. Unsuccessful application, on the other hand, can lead to

work related MSDs. It is critical to seek prompt medical care for symptoms of ergonomic stress/detect risk factors. We should start incorporating good ergonomics in our dental practice and shall see the results from day 1 in the form of less fatigue and increased efficiency.

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APPENDIX 1

I.T.S – Centre for Dental Studies and Research, Muradnagar, Ghaziabad

Department of Oral Medicine and Radiology

ERGONOMIC AWARENESS QUESTIONNAIRE

We are conducting an awareness survey on Ergonomics in Dental Office and would request you to please fill up this short questionnaire. The aim of the survey is to infer the awareness about ergonomics and to identify major risk factors contributing to the development of musculoskeletal disorders due to poor ergonomics.

1. Are you aware of the term 'Ergonomics' and its implications in Dental Office?
 Yes
 No
2. If yes, then are you following principles of Ergonomics in your practice?
 Never
 Sometimes
 Every now and then
 Always
3. Do you take micro breaks (2-5 min) during a procedure?
 Yes
 No
4. Are you aware of posture related musculoskeletal disorders?
 Yes
 No
5. Have you ever experienced any symptoms in neck, shoulders, hands or back during working?
 Yes
 No
6. If yes, please elaborate with duration and intensity of symptoms

7. Do you know about any exercises to strengthen your back, shoulders or hands?
 Yes
 No

7. If yes, do you practice them?

Yes

No

8. Have you ever noticed that you practice with awkward postures involving excessive bending of the back, prolonged sitting/standing?

Yes

No

9. If yes, Is it a regular practice?

Yes

No

10. Is there constant vibration in the instruments/handpiece you are using?

Yes

No

11. Are you aware of magnification and visualization aids that may help you ergonomically?

Yes

No

12. If yes, do you use them?

Yes

No

13. Is the temperature of the working area comfortable for you?

Yes

No

14. Is the workplace adequately lit?

Yes

No

15. Do you practice four handed dentistry?

Yes

No

16. Did you ever seek medical consult for your symptoms?

Yes

No

17. If yes, did you undergo any treatment?

Yes

No

18. The medical conditions/habits listed below may predispose individuals to repetitive strain injury.

If you have any of the listed conditions and are comfortable disclosing them, please do so.

Rheumatoid arthritis

Diabetes mellitus

Pregnancy

Overweight

Hypothyroidism

Myalgia

Birth control/hormonal drugs

Smoking

Lupus

19. What is your physical activity status? Do you exercise regularly?

Yes

No

This is to certify that the information provided above is true and best of my knowledge

Date: