ERGONOMICS KNOWLEDGE AND PRACTICES OF DENTAL INTERNS IN ISLAMABAD

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ABSTRACT

The precise and infinitesimal nature of a dentist's work makes this profession particularly vulnerable to ergonomically borne musculoskeletal disorders (MSDs) that reduce efficiency, productivity and longevity of their dental careers.

The aim of this cross sectional study on a convenience sample of 67 dental interns in a teaching hospital in Islamabad was to evaluate a correlation between theoretical knowledge and practice of ergonomic work postures and behaviors. Data was collected over the month of March 2018 using a pre-tested 24-item questionnaire on knowledge and practices of ergonomics. Open-ended responses of a qualitative nature also were invited for the practices section.

Analysis using SPSS version 20 revealed a knowledge score of 52.9% ± 17.6% while the practices score was 40% ± 10%. Pearson's coefficient obtained was +0.299 with a p-value of 0.67, indicating no correlation between knowledge and practices. Qualitative responses indicate that having theoretical knowledge does not necessarily mean it translates into practical application. Students, when learning new clinical skills, pay more attention to mastering the dental procedures rather than paying attention to their postures. Additionally they do not observe appropriate ergonomic practices by their seniors who should be role models to emulate.

In conclusion, ergonomics is introduced to dental students briefly during pre-clinical training but paid little attention to during their clinical rotations. Therefore, emphasis on ergonomic work postures and behaviors should be increased during undergraduate training for both pre-clinical and clinical rotations. Regular refresher awareness seminars for interns and junior teaching faculty is imperative.

Key Words: *Ergonomics, knowledge, practices, dental interns*

INTRODUCTION

Ergonomics, the science of fitting the work environment to the worker for maximum efficiency and safety, is of utmost importance in dentistry because the precise, infinitesimal nature of dental procedures makes a dentist particularly vulnerable to ergonomic driven hazards.[1]

Dental ergonomic risk factors include prolonged static postures of upper body, repetitive mechanical stress due to precision required with treatments, force stresses, vibrations from the dental equipment, inadequate work breaks and improper posture of dentist.[2] Consequences of ergonomically poor working conditions leads to a wide range of musculoskeletal disorders (MSDs) The most commonly presented MSDs by dentists are found in the regions of the neck (75%), shoulder (69%), lower back/hips (72%), and wrists (73%), ankles (12%) and elbows (7%).[3,4] Often MSDs present in more than one region. Age (years of dental practice) and gender play a role. Older dentists and female practitioners both exhibit a higher prevalence of MSDs.[5] These health ill-effects reduce the efficiency and productivity of dentists resulting in high absenteeism from work and in severe cases premature retirement from career.[6]

Research on ergonomically related MSDs in Pakistan shows that Pakistani dentists also show high prevalence of MSDs. At an average, 70-90% of dentists complained of at least one episode of musculoskeletal pain in the past one year with common presentations of lower backache (49-65%), neck ache (28-53%) and pain in wrist (15-37%). Most studies showed that very few dentists used dental loupes or observed the requisite breaks/stretches between patients and alternating sitting and standing positions.[7-9]

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In the past two decades, the dental industry in Pakistan has expanded due to the rapid mushrooming of private and public dental colleges that has led to an exponential number of dentists graduating every year. Currently there are 45 dental colleges across the country and as of January 2018, 23255 dentists are licensed to practice.[10] The gender ratio (female to male) of dental health professionals is a 3:1, showing a dominance of female dentists.[10] This becomes an important factor given female dentists are more prone to health ill effects of ergonomic hazards.[5] A vast majority of graduating dentists enter private practice, which means that most will work long hours to ensure profitability, and thus become more vulnerable to MSDs if ergonomic habits are poor.

According the Pakistan Medical and Dental Council approved curriculum for BDS, the concept of ergonomics is introduced as a chapter on occupational hazards in the subject of Community Dentistry during 2nd year of training when the students have not yet started their clinical rotations. During the next two years when clinical rotations start, ergonomics is reinforced only during the introduction to operative dentistry focusing on operator/patient positions and four-handed dentistry. Research has shown chairside habits and skills developed during dental school training tend to continue for a lifetime unless subjected to intervention early into the career.[11] Therefore it is imperative to evaluate whether the training imparted to students in terms of ergonomic working principles and practices is sufficient to ensure productivity, safety and longevity of their professional lives. This study was conducted to assess theoretical knowledge and practices of fresh graduate dental interns towards ergonomic work postures and behaviors in their clinical practice.

METHODOLOGY

An observational cross sectional study was carried out in Islamabad Medical and Dental College (IMDC), Islamabad over a period of four weeks of March 2018. Ethical approval was obtained from the IRB committee of the teaching institute. A convenience sample of 74 house officers working in Islamabad Dental Hospital, Bhara Kahu were approached, during their free time, to fill a self-administered, anonymous questionnaire. All the subjects were graduates of the IMDC. Written Informed consent was obtained from participants based on assurance of anonymity, confidentiality of data and with no incentives offered. No effort was made to involve the non-respondents.

Researchers, based on the curriculum taught to the students during their undergrad studies and the Harvard University program on survey research [12], developed a questionnaire on knowledge and practices of dental ergonomics. The draft questionnaire was pilot tested on 18 candidates [13] who had completed their house job and were not part of the study sample. Subsequent modifications and revisions were carried out until a Cronbach alpha value of 0.783 on knowledge section and 0.805 on practices section was obtained to ensure internal reliability and consistency. The final version was a 26-item questionnaire composed of 2, 17 and 7 questions on demographics, knowledge and practices respectively.

Knowledge questions were MCQs on 4 categories, mainly 'role of dental ergonomics', 'operator positions', 'workstations' and 'Instrument/ PPE protocols' which were assessed by a dichotomous method where every correct answer marked as '1' and incorrect as '0', giving a score range of 0-17. Questions left unanswered were also marked as '0'. Six questions on practices were evaluated on a Likert scale composed of five options of never (1), rarely (2), sometimes (3), often (4), and always (5), giving a score range between 7-30. However, one question on 'taking a break between patients' was evaluated on options of 'never', 'once a day', 'twice a day', 'after 2-3 patients' and 'between each patient'. All practice questions also had an open-ended option to allow subjects to volunteer reasons behind why 'never/ rarely' was the cited practice, if applicable. This was to give a qualitative insight to the deficiency of an ergonomically advised behavior. Analysis of the qualitative component was carried out by recording frequently repeated comments and findings presented verbatim.

Incomplete questionnaires that had five or more questions (20%) unanswered were discarded. Questionnaires were then numbered and data entered into SPSS version 20. To ensure completeness of data, 10 randomly selected questionnaires were double-checked for correct entry of all questions.

Results

Participation rate of the study subjects was 94.5% where of the 74 subjects approached, four declined to participate. Three questionnaires were deemed incomplete and discarded. Therefore, analysis was carried out on a sample size of 67. Gender distribution was 56 (83.5%) female and 11 (16.4%) male. The mean age with one standard deviation of the study group was 25.4 ± 2 years.

Results of evaluation of knowledge of ergonomic hazard were a mean score, with one standard deviation, of 9 (52.9%) ±3 (17.6%) out of 17 (100%). For ease of comparison, the scores were divided into three equally distributed categories of 'poor' (0-5), 'fair' (6-11) and 'good' (12-17). The majority of the dentists exhibited fair scores (42, 62.7%) while 14 (20.9%) and 11 (16.4%) recorded poor and good scores respectively.

Results of ergonomically advised practices indicated a mean scores, with one SD, of 12 (40%) ± 3 (10%)

TABLE 1: FREQUENCY OF ERGONOMIC PRACTICES BY DENTAL INTERNS

Practice	never	rarely	sometimes	often	always
Maintain ergonomically neutral position	5 (7.4%)	43 (64.3%)	15 (22.4%)	4 (5.9%)	0 (0%)
Use of dental loupes	56 (83.5%)	9 (13.4%)	2 (3.1%)	0 (0%)	0 (0%)
Alternate between standing and sitting	17 (25.4%)	19 (28.3%)	25 (37.4%)	6 (8.9%)	0 (0%)
Do you do chairside stretches	15 (22.4%)	21 (31.5%)	18 (26.8%)	11 (16.4%)	2 (2.9%)
Do you practice four-handed dentistry	1 (1.5%)	20 (29.8%)	33 (49.2%)	13 (19.5%)	0 (0%)
Do you exercise?	6 (8.9%)	8 (11.9%)	23 (34.4%)	16 (23.9%)	14 (20.9%)

TABLE 2: QUALITATIVE REASONS FOR NOT ADOPTING AN ERGONOMIC PRACTICE

Practice	Qualitative reason for 'never/rarely' cited as the practice
Maintain ergonomically neutral position	I get too engrossed in the procedure
	It's easier to adjust myself according to patient's demand
	Indirect vision is too difficult
	Hospital equipment (stool) is not ergonomically designed
Use of dental loupes	no knowledge/information about loupes was given
	loupes not available in hospital; too expensive
	very difficult to adjust vision with movement
Alternate between standing and sitting	I can do procedures better if I am sitting
	I can do procedures better if I am standing
	I did not know this was an ergonomic requirement
Chairside stretches	It's too embarrassing to stretch in front of others
	I do 'purdah', so I cannot do stretches in public
	I don't know which stretches to do
	I've never seen any senior doing stretches
Practice four-handed dentistry	It all depends if there is an assistant available
How often do you take a break in a working day	Heavy patient workload,
	Permission not granted by department
	I want to finish all my patients as quickly as possible
	I want to learn as much as I can and not waste my time.

out of 30 (100%). The frequencies of the practices is summarized in Table 1.

The practice of taking break 'once during a working day' and 'twice a day' was recorded by 13 (19.4%) and 7 (10.4%) subjects respectively while 5 (7.4%) interns opted for taking a break after every 2-3 patients. Only 7 (10.4%) interns took a break between each patient while 35 (52.2%) never took a break at all during the working day.

Results of the qualitative insights of why the option of 'never' or 'rarely' practicing an ergonomically advised behavior are listed in Table 2

Correlation between knowledge and practices was insignificant as Pearson's coefficient of correlation calculated was +0.299 with a p-value of 0.67.

DISCUSSION

Creating the habit and instinct to adopt ergonomic work postures for dental students is a very important part of their training as this prevents the development of MSDs, thus improving work efficiency and longevity of their careers. From our research, it is apparent that theoretical knowledge on ergonomic neutral positions imparted during dental undergraduate training can considered borderline satisfactory but there is room

for improvement. However, our study also shows that having sufficient knowledge on ergonomic behaviors does not necessarily mean that ergonomically safe practices are adopted on the chairside, a finding that is attributable to a lack of focus on ergonomics during clinical training. These findings are similar to an Indian study that identified a neglect in ergonomic training from both a knowledge and clinical practice point of view.[14] The lack of correlation between knowledge and practice was a finding similar to research by Vyas k. et al[15] and a Brazilian study that followed up students who, despite undergoing an ergonomic training intervention workshop, failed to correlate theory into practices[16].

Qualitative findings in our study indicate that the interns may have sufficient theoretical knowledge on ergonomic work postures but little understanding of practical aspect of other ergonomic chairside habits. Students develop poor habits when learning new skills as they pay more attention to mastering the procedures rather than paying attention to their postures. Another factor was a lack of role model behavior by seniors to emulate. All these aspects are attributable to a deficiency during training; a fact that indicates teaching faculty, who should be role models, need regular updating and awareness of their own ergonomic practices in the departments. Research has shown that the best time to emphasize ergonomic chairside behaviors is during pre-clinical days when students are practicing on mannequins[17], and this focus should continue constantly during their clinical training on patients[16]. Demonstrators are the first-line teaching faculty in the clinical setting and by default, become the role model examples of chairside behaviors that students observe and learn.

Therefore, it is imperative that academic focus on ergonomics should be increased during undergraduate training for both pre-clinical and clinical rotations. Additionally, this should be augmented with regular refresher awareness seminars for interns and teaching faculty, especially demonstrators, along with provision of appropriate ergonomically recommended equipment and machinery, wherever applicable.

REFERENCES

1 World Health Organization. "Protecting Workers Health Series # 5. Preventing Musculoskeletal Disorders at the Workplace". Available at http://www.who.int/occupational_health/publications/muscdisorders/en/ accessed 2nd May 2018.

2 An Introduction to Ergonomics: Risk factors, MSDs, Approaches and Interventions. Report by EDSAC American Dental Association. Available at https://cdn.shopify.com/s/files/1/1171/2566/files/topics_ergonomics_paper_2.pdf accessed on 2nd May 2018

3 Bedi HS, Moon NJ, Bhatia V, et al. Evaluation of Musculoskeletal Disorders in Dentists and Application of DMAIC Technique to Improve the Ergonomics at Dental Clinics and Meta-Analysis of Literature. J Clin Diagn Res. 2015;9(6):1-3.

4 Batham C, Yasobant S. A risk assessment study on work-related musculoskeletal disorders among dentists in Bhopal, India. Indian J Dent Res. 2016;27(3):236-41

5 American Dental Association. 2015 Dentist Well-being Survey Report. Available at https://ebusiness.ada.org/assets/docs/32944.PDF?OrderID=1364096 accessed on 3rd May 2018

6 Gharibi V, Mokarami H, Taban A, et al. Effects of Work-Related Stress on Work Ability Index among Iranian Workers. Saf Health Work. 2016;7(1):43-8

7 Tareen S, Khattak Y, Rehman S. Ergonomics related disorders among dentists in Peshawar- a questionnaire survey. JKCD 2013, 3 (2): 24-9.

8 Rehman B., Aslam A., Ali A., Tariq A. Ergonomic Hazards to Dental Surgeons – A Cross-sectional study. PODJ 2016;36(1): 168-71

9 Rehan S., Leghari M.A., Memon S., et al. Frequency of Musculoskeletal Discomfort among Dentists in Karachi, Pakistan. PODJ 2014;35(4): 631-4

10 Pakistan Medical and Dental Council statistics ; http://www.pmdc.org.pk/Statistics/tabid/103/Default.aspx accessed on 3rd May 2018

11 Koole S, Van Den Brulle S, Christiaens V, Jacquet W, Cosyn J, De Bruyn H. Competence profiles in undergraduate dental education: a comparison between theory and reality. BMC Oral Health. 2017;17(1):109-12

12 Chase Harrison. Questionnaire Design Tip Sheet. Harvard University Program on Survey Research. 2017. Available at https://psr.iq.harvard.edu/book/questionnaire-design-tip-sheet accessed on 4th Sep 2018.

13 Julious, S. A. Sample size of 12 per group rule of thumb for a pilot study. Pharmaceutical Statistics, 2005;4:287-91.

14 Kalghatgi S, Prasad KV, Chhabra K2, Deolia S, Chhabra C. Insights into ergonomics among dental professionals of a dental institute and private practitioners in Hubli-Dharwad twin cities, India.Saf Health Work. 2014;5(4):181-5.

15 Vyas K., Parihaar L.,Rajoria k., et al. Knowledge, Attitudes and Behaviors towards "Ergonomics" amongst Oral Health Professionals in Jodhpur City, Rajasthan, India. I J Pre Clin Dent Res 2014;1(3):5-9

16 Garcia PP, Gottardello AC, Presoto CD, et al. Ergonomic work posture in undergraduate dentistry students: Correlation between theory and practice. J Educ Ethics Dent 2015;5:47-50.

17 Garcia PP, Wajngarten D, Gottardello AC, et al. Occupational ergonomics: Work posture among Brazilian dental students. Occup Saf Hyg 2013:5(2):303-6.

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