TO EVALUATE AWARENESS ABOUT ERGONOMICS IN UNDERGRADUATE STUDENTS HAVING CLINICAL POSTINGS IN AMC DENTAL COLLEGE: A QUESTIONNAIRE SURVEY

ABSTRACT:

OBJECTIVE: To assess knowledge, attitude and practice about ergonomics among undergraduate students during clinical postings in AMC Dental College.

MATERIALS AND METHODS: This cross-sectional study was conducted on undergraduate students having clinical postings at AMC Dental College. The IRB approved study was conducted through 16 validated questionnaire form sent through email to the participants after obtaining their informed consent. Results were tabulated and presented in percentage (%).

RESULTS: 150 students from the third year, final year, and internship participated after signing informed consent with 28.2% male and 71.8% female respondents. The results showed that majority of the undergraduate dental students have knowledge regarding ergonomics and has positive attitude towards ergonomics but they are not practicing it in routine dental procedures.

CONCLUSION: Understanding and applying ergonomic principles can help decrease work-related injuries, increase productivity, and enhance the overall quality of dental care. There is a need to include ergonomics in the dental curriculum, with an emphasis not only on theoretical knowledge but also on its practical application during various dental procedures and the assessment of ergonomics and motivation for the same from time to time during clinical postings.

INTRODUCTION:

Ergonomics is a scientific discipline focused on interacting with workers and their environment [1]. In dental practice, the precise and repetitive wrist and hand movements required to perform tasks within the confined space of a patient's mouth often demand significant hand stability. This necessity frequently results in dentists spending extended periods in static, uncomfortable, and awkward postures, leading to musculoskeletal strain, particularly in the lower back [2]. Ergonomics is highly recommended to mitigate work-related musculoskeletal disorders among dentists. This approach involves two key strategies: adopting static postures and movement patterns that minimize strain during work, and utilizing well-designed tools and procedures to enhance efficiency, safety, and comfort. Implementing dental ergonomics may include adjusting the clinician’s and patient's chairs, positioning, instrumentation within easy reach, and maintaining optimal postures for various clinical procedures to reduce physical strain on the clinician's neuromusculoskeletal system.

According to the curriculum proposed by the Dental Council of India (DCI), undergraduates (BDS) are first exposed to clinical working conditions in their 3rd year. During this time, students are exposed to cinical postings for a fixed duration. This period is ideal for teaching

ergonomics as part of the regular curriculum, emphasizing its importance in practice and adherence to guidelines. Therefore, undergraduates, specifically 3rd- and 4th-year BDS students, were included as study participants [3]. Static positions cause increased fatigue. Research supports the notion that workers should frequently change their work positions to distribute the workload among different muscle groups [4].

Studies by Fish et al. and Murphy et al. suggest that taking micro-breaks during work improves efficiency in dental procedures. Other ways to enhance ergonomics and reduce musculoskeletal disorders (MSDs) include using indirect mirror viewing, following recommended nutrition and exercise practices, and ensuring proper lighting. Physical inactivity among dentists appears to increase their risk of MSDs, contributing significantly to decreased work efficiency and early retirement due to ill health [5,6].

To ensure ergonomically safe practice and avoid adverse effects, attention should be given to the following: 1) proper lighting and magnification, 2) wearing PPE, 3) keep proper posture, 4) positioning the patient correctly, 5) using ergonomically designed instruments.

MATERIALS AND METHOD:

Following approval from the Institutional Review Board at AMC Dental College, Ahmedabad, a study was conducted via an online survey in March and April 2023. 300 students were approached, with 150 participants from the third year, final year, and internship responded with informed consent. The online validated questionnaire was distributed to students through social networking platforms. The results were tabulated and presented as percentages.

QUESTIONNAIRE DESIGN:

A questionnaire consisting of 16 close-ended questions was prepared consisting of demographic data along with questions regarding ergonomics which was divided into three categories: knowledge, attitude and practice of dental students. Participant information sheet was prepared mentioning the purpose of the study. After signing the informed consent, the participants submitted the sheet through social networking platforms.

The collected data were entered into computer software for analysis. Percentages were independently calculated for each section to determine the frequencies. Results were then calculated and compared across each section and category.

RESULTS:

150 students from the third year, final year, and internship participated with 28.2% male and 71.8% female respondents.

Table 1: Knowledge of dental students regarding ergonomics

Questions	Options	Percent

Term ergonomics/workplace efficiency in dentistry is related to	Safety and efficiency of work and working conditions around operator	69.6
	Sharpness or worn out of instruments used in procedure	10.1
	Prevention of occupational disease	10.8
	Interaction between operator and patient	9.5
What do you use to acquire knowledge?	Seminar/Workshop	44.6
	Internet	77
	Newspaper	6.8
	Textbooks	35.1
Risk factors associated with work related musculoskeletal disorders	Improper posture	4.7
	Repetitive motion	1.4
	Poor fitness level, nutrition or stress	2.7
	All of the above	72.3
	Not sure	18.9
At what age dentist can start suffering from musculoskeletal disorder	Can happen at any age	25.7
	More than 10 years of dental practice	46.6
	Less than 10 years of dental practice	4.1
	Not sure about it	23.6
Most frequently affected area in work related musculoskeletal disorder	Lower limb	7
	Shoulder and hands	5.4
	Neck and back	18.2
	All of the above	62.2
	Not sure	13.5
Long standing operator position	Varicose vein	2.7

or improper feet and leg position can lead to	Edema and pain in lower limb	3.4
	A and B both	75
	None of the above	18.9
Are you aware of different correct operating positions for surgical and non surgical procedures?	Yes	93.9
	No	6.1

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77 Table 2: Attitude of dental students regarding ergonomics

Questions	Options	Percent
Do you think that four handed can affect ergonomics?	Yes	95.3
	No	4.7
Do you suffer from musculoskeletal problem related to work?	Yes	19.6
	No	29.1
	Sometimes	51.4
According to you can following be the measures to decrease the possibility of having work related musculoskeletal disorder	Proper posture	2.7
	Exercise	3.4
	Use of proper lighting	2.7
	Wearing proper sized gloves	2.0
	All of the above	77
	Not sure	12.2
Do you think awareness about ergonomics will help you in prevention of work-related musculoskeletal disorders?	Yes	100

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Questions	Options	Percent
Do you adjust dental chair position and operating stool height as required	Yes	18.2
	Often	10.1
	Sometimes	60.8
	Never	10.8
Time duration you maintain upright back position while working	Beginning of the procedure only	25
	During the entire procedure	8.8
	I keep changing between upright and bent position	53.4
	No, I don't follow the upright position at all	12.8
Position of feet followed by you	Slightly tilted	4.1
	Feet on the part of operating stool	37.2
	Feet flat and slightly separated on the floor	49.3
	Feet flat and close together on the floor	9.5
Method preferred by you while treating maxillary arch	Indirect vision	18.2
	Direct vision	14.9
	Alternately indirect and direct vision	66.9
Method preferred by you to improve vision for particular surface	Perform torsion of body to improve direct vision	4.7
	Perform cervical flexion to improve direct vision	16.2
	Perform both cervical flexion and torsion of body	52.7
	Use indirect vision and maintain the upright posture	26.4

In this questionnaire survey, 7 questions regarding knowledge were asked. 69.6% of students with clinical postings were aware of the term ergonomics out of which 77% of students acquiring knowledge from the internet whereas 72.3% of students knew risk factors associated with work related musculoskeletal disorders are improper posture, repetitive

motion, poor fitness level, nutrition, or stress. 38% of students believed dentists can start suffering from musculoskeletal disorders at any age. In comparison, 69% students thought that it can happen at more than 10 years of dental practice, 6% believed that it can happen at less than 10 years of dental practice and 35% were not sure about it. The neck and back were the most frequently affected areas in work-related musculoskeletal disorders, which were known by 27%. 75% of students knew that long-standing operator position or improper feet and leg position could lead to varicose veins and edema and pain in the lower limb. 93.9% of students were aware of different positions for surgical and non-surgical procedures.

In our study, 4 questions were asked relating to the attitude of dental students regarding ergonomics. 95.3% of students think that four-handed dentistry can affect ergonomics. 19.6% of students suffer from work-related musculoskeletal disorders, while 51.4% of students suffer sometimes and 29% of students don't suffer. 77% of students believe proper posture, exercise, appropriate lighting, and wearing proper sized gloves decrease the possibility of having work-related musculoskeletal disorders.

In this survey, 5 questions were asked regarding the practice of ergonomics among dental students. Only 18.2% of students adjust their dental chair position and dental operating stool height as required. 37.2% of students placed their feet on the part of the operating stool while working. 66.9% of students preferred alternately indirect and direct vision while treating maxillary arch.

So, the results showed that majority of the undergraduate dental students have knowledge regarding ergonomics and has positive attitude towards ergonomics but they are not practicing it in routine dental procedures.

DISCUSSION:

Musculoskeletal pain is a significant issue recognized among dental professionals, impacting their efficiency and job satisfaction. This problem is primarily attributed to improper workplace ergonomics [3]. Ergonomics has consistently been overlooked in both knowledge and practice during clinical work. Furthermore, ergonomics is not included in the syllabus proposed by the Dental Council of India (DCI) for both undergraduate and postgraduate levels. As a result, knowledge of ergonomics is disseminated solely through informal means. This necessitates assessing knowledge, attitude and practice towards ergonomics among undergraduate students in the third year, final year and internship.

The present study shows that 103 participants (69.6%) accurately identified the definition of ergonomics in terms of knowledge. This finding contrasts with a study in Saudi Arabia, where the majority of participants, 70%, reported lacking knowledge of ergonomics literature [7]. While knowledge scores were 47% in dental students in a private dental college, Chennai, India [8]. This indicates differing levels of understanding and knowledge about ergonomics among participants from various countries.

In a study published in 2011, Kanteshwari *et al*. examined practitioners' knowledge of the appropriateness of various postures used during dental procedures and attempted to determine whether there was a relationship between proper or improper posture and the development of MSDs. Less than 50% of respondents reported being aware of ergonomic posture, and 70% reported having musculoskeletal pain, according to their findings [9].

Several studies have shown that the physical strain experienced by dental professionals while providing treatment can lead to work-related musculoskeletal disorders (WRMSDs) [3]. The risk of developing WRMSDs is higher among dental professionals due to their need to work in a confined environment that places high demands on vision, requires excessive force, and involves precise, repetitive hand and wrist movements while sitting in static or awkward postures [10,11]. Back pain is reported as the most common WRMSD among dentists, followed by neck pain, high tension in upper limb muscles, carpal tunnel syndrome, tendinitis, and arthrosis [12,13]. Despite the increasing practice of four-handed dentistry and ergonomically designed equipment, studies show that at least 73% of dentists experience back and neck pain and 81% of dental professionals report developing pain in the neck, shoulders, and arms [14].

Symptoms of WRMSDs can emerge very early in dental professionals' careers, sometimes even during their educational training [15]. Typically, such pains and soreness develop gradually and are often ignored until they become chronic, permanent, and challenging to treat [16,17]. Back pain has been found to be exacerbated by incorrect patient positioning in relation to the operator, maintaining the neutral position, and back position.[5] This supports research by Al Wazzan *et al*. from Saudi Arabia, which found that dental practitioners had a significant prevalence of lower back discomfort (74%).[18] Morse *et al*., in 2007, found that among dental students, 11% of students had shoulder pain and 37% of students had neck pain.[19] Dentists frequently fail to maintain neutral postures throughout their daily work, which directly contributes to MSD. According to research, more than 80% of dental professionals report experiencing upper body and back pain as a result of holding a position that is overly strenuous for an extended period.[20] This suggests that working in a strained position and performing abnormal twisting or bending cause musculoskeletal pain.

Numerous studies have demonstrated that applying dental ergonomics principles can reduce or eliminate symptoms related to WRMSDs among dentists [21]. Therefore, following the principle that "prevention is better than cure," there should be a greater emphasis on teaching dental ergonomics to students before they begin their hands-on clinical training. Information about dental ergonomics and WRMDs is uniquely relevant to the well-being of dental students and professionals, unlike other subjects which primarily focus on patient care.

A lack of understanding of ergonomics theory, a gap between the theoretical area and its practical application, and an environment inappropriate for ergonomically acceptable dental practice can all make it difficult to learn ergonomic concepts. This is an intriguing development in both the teaching and learning process and the way assessments are made. The application of academic knowledge of ergonomics to their routine dental practice is the need of the hour for students. The procurement of knowledge of ergonomics can happen at any time; however, its prompt implementation enhances assimilation and incorporation, preventing the formation of harmful habits [22].

CONCLUSION

Understanding and applying ergonomic principles can help decrease work-related musculoskeletal disorders, increased productivity, and enhance the overall quality of dental care. There is a need to include ergonomics in the dental curriculum, with an emphasis not only on theoretical knowledge but also on its practical application during various dental procedures and should be assessed from time to time.

CLINICAL SIGNIFICANCE

Students should be encouraged to apply the principles of dental ergonomics they have learned. To support this, dedicated theoretical and practical courses covering all aspects of dental ergonomics should be incorporated into the undergraduate curriculum. Additionally, clinical instructors should ensure that students adhere to these principles during their clinical assignments and should be assessed from time to time, and it is advisable to include the application of dental ergonomics principles in the students' clinical evaluations. This will help identify and address any discrepancies promptly. Emphasizing the correct application of these principles early on can assist students in maintaining good ergonomic practices throughout their careers, thereby reducing the risk of WRMDs.

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