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## **Assessment Of Knowledge, Attitude & Practice of Dental Students Towards Ergonomics in Dentistry**

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## **Assessment Of Knowledge, Attitude & Practice of Dental Students Towards Ergonomics in Dentistry**

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### **ABSTRACT**

**Introduction:** Ergonomics is a field of science that strives to learn about human abilities and weaknesses and then use that knowledge to enhance people's interactions with products, systems, and environments. Ergonomics seeks to change workspaces and conditions to minimize the risk of injuries or damage. As technology evolves, so too is the need to ensure that the instruments we have access to for work, rest, and play are built to meet the needs of our bodies. This study aims at assessing the knowledge, attitude, and practice of dental students towards ergonomics in dentistry.

**Materials and methods:** A self-structured questionnaire survey based on the assessment of the knowledge, attitude, and practice of dental students towards ergonomics in dentistry, a prospective study comprising about 120 people were circulated on an online survey platform using Google forms and were asked to take up the survey by the students. The questionnaire was tested for validation at the Saveetha Dental College, Chennai. The results were collected and the data was analyzed by Pearson chi-square test using SPSS Software version 23 at  $p < 0.05$ .

**Results:** The survey results recorded that 35% were between 20-25, 33.33% were between 18-20 and 31.67% were between 25 & above. About 61.67% were Females, 38.33% were Males. The results and statistics were analyzed using SPSS software ( $P$  value  $< 0.05$ ). The majority of the respondents were assessed to have good knowledge, attitude, and practice about ergonomics in dentistry.

**Conclusion:** Effective use of ergonomics ensures maximum efficiency and prevents injuries or illnesses. The identification of risk factors and the application of ergonomic strategies are essential. Students have awareness of ergonomics and are knowledgeable of its contribution to workplace health. However, they are having difficulty adopting ergonomic postures.

**Keywords:** Knowledge, Awareness, Practice, Ergonomics, Dentistry, Innovative technology

### **INTRODUCTION**

Dental professionals are often susceptible to a set of occupational risks, including physical, chemical, biochemical, and ergonomic hazards, many of which cause musculoskeletal disabilities. Ergonomics is a process in which workplaces, products, and systems are designed or arranged to suit the individuals who use them. Ergonomics refers to the architecture of something that affects humans – workplaces, recreation and entertainment, health and safety (1). Ergonomics (also known as "human factors" in North America) is a field of science that strives to learn about human abilities and weaknesses and then use that knowledge to enhance people's interactions with products, systems, and environments (2). Ergonomics seeks to change workspaces and conditions to minimize the risk of injuries or damage. As technology evolves, so too is the need to ensure that the instruments we have access to for work, rest, and play are built to meet the needs of our bodies (3).

Ergonomics intends to promote workspaces that are clean, convenient, and effective by taking into account human capacities and shortcomings, such as body size, weight, skill, speed, and sensory abilities (vision, hearing) (4). Healthcare practitioners, ergonomists, and human factors professionals in collaboration with physicians, administrators, and IT specialists to maintain a secure and resilient 21st-century healthcare system (5). Much attention has been paid to strengthening cooperation between physicians, meaning that teams of doctors and nurses work together to make better decisions and minimize the risk of injury. In addition to this valuable work, most of the equipment we find in a hospital environment, from ambulances to life-saving

medications, has been developed and tested by human factors experts. Each profession has its related threats and workplace hazards, which inevitably bring ergonomics into the picture (6).

The dental practice involves systematic dental planning with great accuracy and control. The muscles used for this reason are at risk of being tired and causing pain to the dentist. The dentist is considered to be the most prone to posture issues due to limited access and impaired vision, making them vulnerable to workplace hazards (7). Proper ergonomic construction should be given the highest priority to avoid long-lasting strain complications that can potentially lead to long-term disabilities. Ergonomic standards aim to create a relatively stable and secure working climate for professionals that can ultimately contribute to improved efficiency (8).

The efficacy of health care delivery programs is a subject of universal interest. Many experts from diverse disciplines have sought to use their methods to address health issues. Innovations in service delivery have expanded thanks to extensive study and the commitment of multiple fields to the challenges (9). Improved materials, modern methods, electronic and electrical appliances, and computers have also entered the world of health care. A special focus has increasingly been paid to forecasting, arranging, and improving care in health facilities.

Of the various technical methods used in dentistry, ergonomics appears to have the most overt impact on dentists and other members of the dental staff. Dentistry has a peculiar trait of the branches of health care in that it involves the involvement of a nurse, traditionally a dentist, close to the patient during the time of administration of therapy. The persistent contact between the dentist, his tools, the auxiliaries, and the patient makes dentistry a natural area for the study of men and their working environment (10).

Considering that the high risk of musculoskeletal disorders in individuals still completing vocational training can threaten their jobs, resulting, for example, in early retirement from the practice, it is necessary to consider why these students have a high prevalence of musculoskeletal disorders. Few reported articles understand students' experience and practice in ergonomics and occupational health. Obtaining this knowledge can direct the teaching of ergonomics in dentistry and contribute to the maintenance of good occupational health (2).

Past research in the ergonomics of dentistry has been generally limited and did not follow a structured framework. Attempts have concentrated primarily upon qualitative rather than quantitative analysis of the dental delivery system. In many cases work in the ergonomics of dentistry has just scratched the surface of problems rather than revealing their roots. Dealing with basic concepts, a feature of ergonomic science, has always been forgotten. Much of the study was undertaken by one party, mainly dentists, and much of it was focused on individual commitment rather than on interdisciplinary team effort (11). This paper introduces a research methodology tool and points out ways in which ergonomics is of the utmost importance. Our team has extensive knowledge and research experience that has translated into high quality publications(12–21),(22–25),(26–30) (31).This study aims at assessing the knowledge, attitude, and practice of dental students towards ergonomics in dentistry.

## MATERIALS AND METHODS

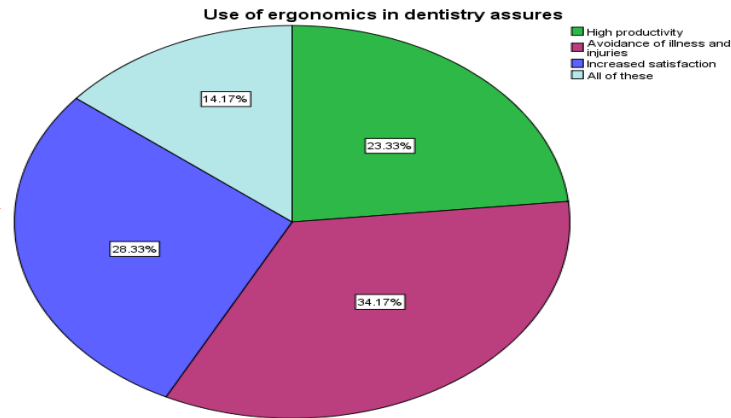
A self-structured questionnaire survey based on the assessment of the knowledge, attitude, and practice of dental students towards ergonomics in dentistry, a prospective study (observational) comprising about 120 people (sample size) belonging to age group 18–20years, 20–25years, 25 years and above, both Male (38.37%) and Female (61.67%) were circulated on an online survey platform (link) using Google forms and were asked to take up the survey by the students. The sampling method involved random sampling. The questionnaire was tested for validation at the Saveetha Dental College, Chennai. The results were collected and the data was analyzed by Pearson chi-square test using SPSS Software version 23 (P value <0.05).

## RESULTS

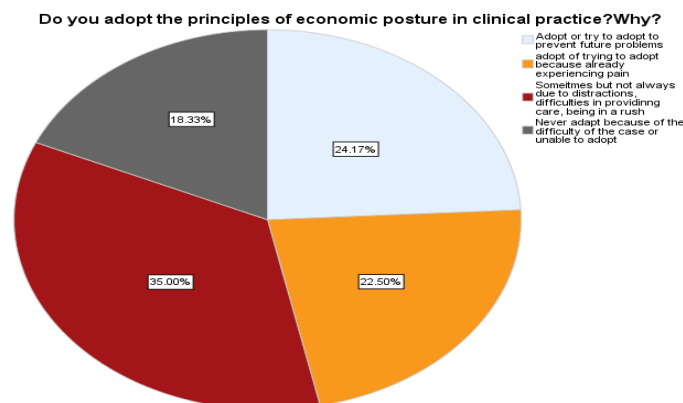
**'Table 1' represents the responses given by the students for the questions asked in the survey.**

S.No	QUESTIONS	CHOICES	RESPONSES
1.	Age	18-20 20-25 25 & above	33.33% 35% 31.67%
2.	Gender	Male Female	38.33% 61.67%
3.	Knowledge about ergonomics in dentistry	Working posture Work movements Rules and measures adopted to	46.67% 33.33%

		optimize work and/or to maintain occupational health All of these	16.67% 3.33%
4.	Reasons for early retirement among dentists	Neurotic symptoms Musculoskeletal disorders Cardiovascular disease Tumors Disease	30% 27.5% 20.83% 16.67% 4.17%
5.	Good health along with the ergonomics	Regular exercise Proper nutrition Relaxation techniques All of these	30.83% 27.5% 22.5% 14.17%



**Figure 1: Pie chart representing the percentage distribution of responses on the 'Use of ergonomics in dentistry assures'. A vast majority of respondents to about 34.17% responded due to avoidance of illness and injuries, 23.33% responded with high productivity and 28.33% responded with increased satisfaction and 14.17% responded 'All of these.**



**Figure 2: Pie chart representing the percentage distribution of responses on the 'Principles of economic posture in clinic practice. A vast majority of respondents to about 35% responded sometimes but not always due to distractions, difficulties in providing care, being in a rush, 24.17% responded adopt or try to adopt to prevent future problems and 22.5% responded adopt or try to adopt because already experiencing pain and 18.33% responded never adopt because of the difficulty of the case of unable to adopt.**

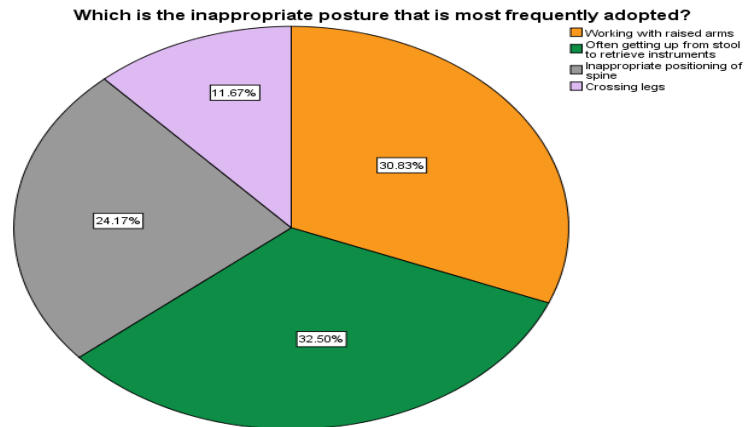


Figure 3: Pie chart representing the percentage distribution of responses on the 'Inappropriate posture that is most frequently adopted'. A vast majority of respondents to about 32.50% responded due to often getting up from stool to retrieve instruments, 30.83% responded working with raised arms and 24.17% responded it was inappropriate positioning of the spine and 11.67% responded crossing legs.

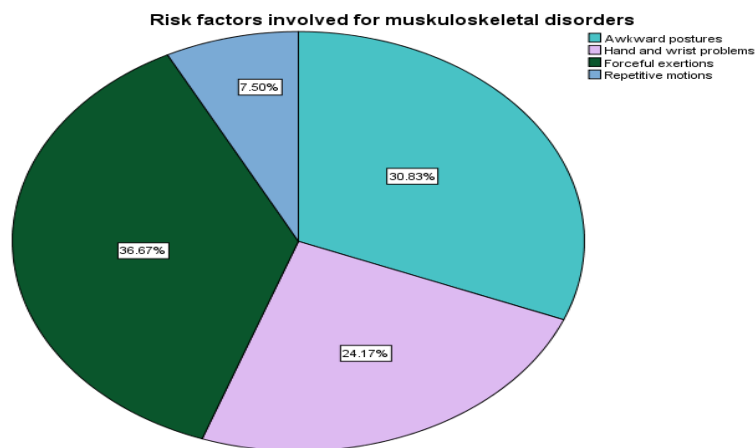


Figure 4: Pie chart representing the percentage distribution of responses on the 'Risk factors involved for musculoskeletal disorders'. A vast majority of respondents to about 36.67% responded to neurotic symptoms, 30.83% responded to awkward postures and 24.17% responded to hand and wrist problems, 7.50% responded to repetitive motions.

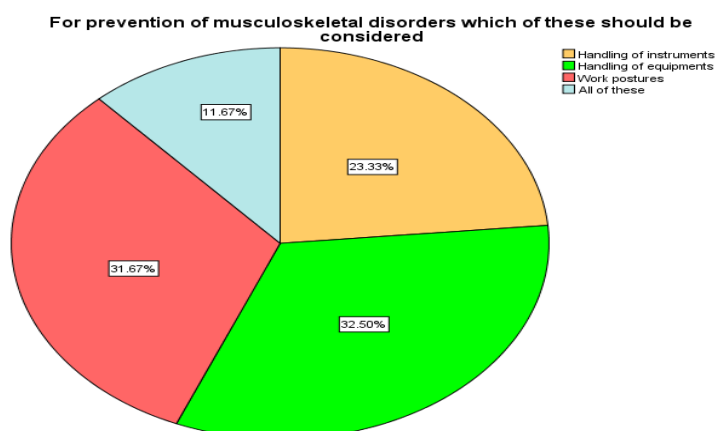
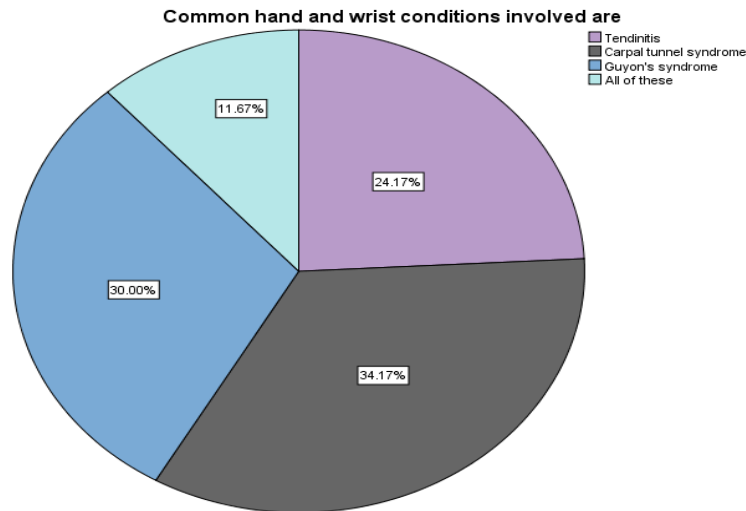
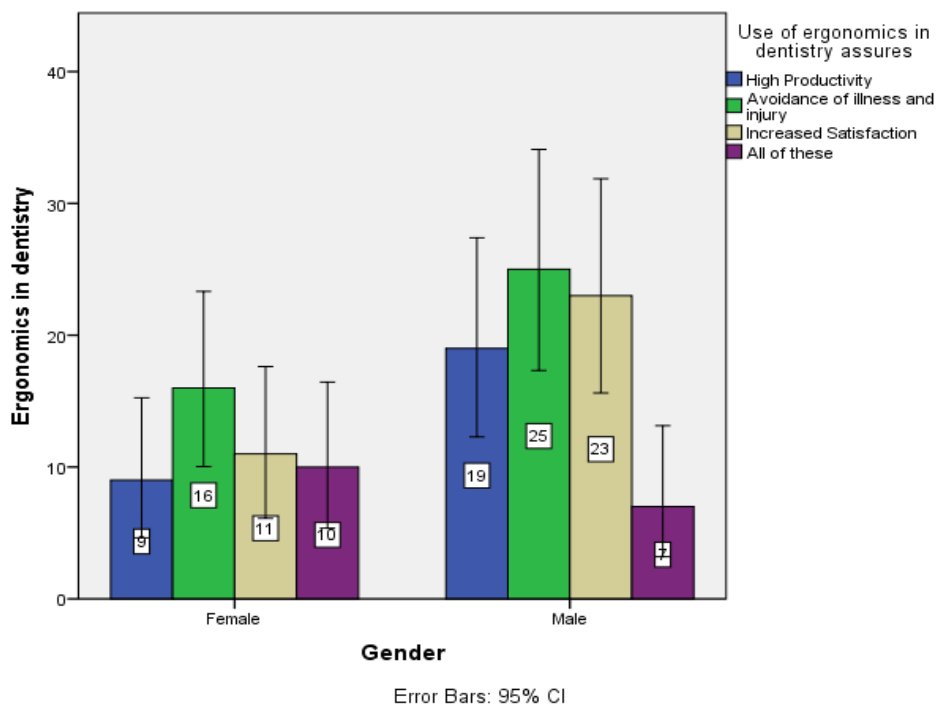


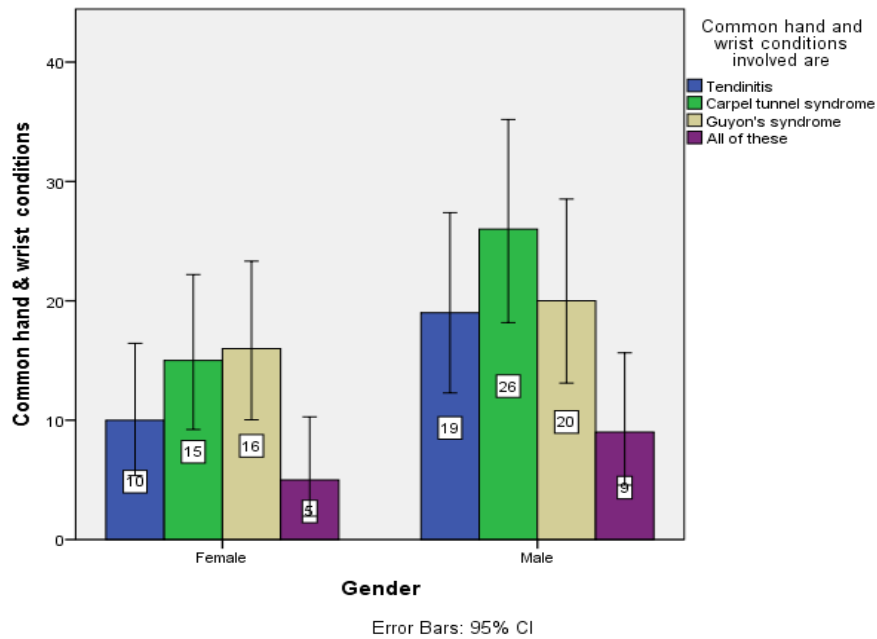
Figure 5: Pie chart representing the percentage distribution of responses on the 'Prevention of musculoskeletal disorders'. A vast majority of respondents to about 32.5% responded to the handling of equipment, 31.67% responded to work postures and 23.33% responded to the handling of instruments, 11.67% responded to repetitive motions.



**Figure 6: Pie chart representing the percentage distribution of responses on the common hand and wrist conditions. A vast majority of respondents to about 34.17% responded to carpal tunnel syndrome (Red), 30% responded to Guyon's syndrome (Yellow) and 24.17% responded to tendinitis (Green), 11.67% responded to all of these (Blue).**



**Graph 1: Association between gender and knowledge on the use of ergonomics in dentistry. The X-axis represents Gender and Y-axis represents the number of participants who answered high productivity (Green), avoidance of illness and injuries (Purple), increased satisfaction (Blue), and all of these (Light blue). Out of 28 people who had answered high productivity, 9 constituted females, and 19 constituted males. Out of 41 who answered to avoid illness and injuries, 16 participants were female and 25 of participants were male. Out of 34 who had answered increased satisfaction, 11 constituted females and 23 constituent males. Out of 17 who answered all of these, 10 constituted females, and 7 constituted males. An association to gender and knowledge under discussion was found to be not significant by the Pearson chi-square test (chi-square value: 3.996, df-3, P-value = 0.262). Thus, statistically, the males and females have the same opinion and knowledge on the type of light preferred.**



**Graph 2: Association between gender and knowledge on the common hand and wrist conditions involved. The X-axis represents Gender and Y-axis represents the number of participants who answered tendinitis (Violet), carpal tunnel syndrome (Grey), Guyon's syndrome (Blue), and all of these (Light Blue). Out of 29 people who had answered tendinitis, 10 constituted females, and 19 constituted males. Out of 41 who answered carpal tunnel syndrome, 15 participants were female and 26 participants were male. Out of 36 people who had answered Guyon's syndrome, 16 constituted females and 20 constituted males. Out of 14 who answered all of these, 5 constituted females, and 9 constituted males. An association to gender and knowledge under discussion was found to be not significant by the Pearson chi-square test (chi-square value: 0.844, df-3, P-value = 0.839). Thus, statistically, the males and females have the same opinion and knowledge on the type of light preferred.**

## DISCUSSION

The results and statistics were analyzed using SPSS software. The majority of the respondents were assessed to have good knowledge, attitude, and practice about ergonomics in dentistry.

The age group of the dental students who responded to the survey. A majority of participants, 35%, were between 20-25, 33.33% were between 18-20 and 31.67% were between 25 & above. The gender of the dental students who responded to the survey. Of the majority of participants, 61.67% were Females, 38.33% were Males. The respondents on the knowledge about ergonomics in dentistry, a vast majority of respondents to about 46.67% responded it was related to working posture, 33.33% responded it was related to work movements and 16.67% responded it was related to rules and measures adopted to optimize work and/or to maintain occupational health and 3.33% responded 'All of these. The respondents for 'Use of ergonomics in dentistry assures' (Figure 1), majority of respondents to about 34.17% responded due to avoidance of illness and injuries, 23.33% responded with high productivity and 28.33% responded with increased satisfaction and 14.17% responded 'All of these.

The respondents for 'Principles of economic posture in clinic practice (Figure 2), a majority of respondents to about 35% responded sometimes but not always due to distractions, difficulties in providing care, being in a rush, 24.17% responded adopt or try to adopt to prevent future problems and 22.5% responded adopt or try to adopt because already experiencing pain and 18.33% responded never adopt because of the difficulty of the case of unable to adopt. The respondents for 'Inappropriate posture that is most frequently adopted' (Figure 3), majority of respondents to about 32.50% responded due to often getting up from stool to retrieve instruments, 30.83% responded working with raised arms and 24.17% responded it was inappropriate positioning of the spine and 11.67% responded crossing legs.

When asked about the 'Reasons for early retirement among dentists, majority of respondents to about 30% responded to neurotic symptoms, 27.50% responded to musculoskeletal disorders and 20.83% responded to cardiovascular disease, 16.67% responded to tumors, and 4.17% responded to diseases. When asked about the 'Risk factors involved for musculoskeletal disorders (Figure 4), the majority of respondents to about 36.67% responded to neurotic symptoms, 30.83% responded to awkward postures and 24.17% responded to hand and wrist problems, 7.50% responded to repetitive motions.

The respondents for 'Prevention of musculoskeletal disorders (Figure 5), majority of respondents to about 32.5% responded to the handling of equipment, 31.67% responded to work postures and 23.33% responded to the handling of instruments, 11.67% responded to repetitive motions. When asked about the common hand and wrist conditions (Figure 6), the majority of respondents to about 34.17% responded to carpal tunnel syndrome (Red), 30% responded to Guyon's syndrome (Yellow) and 24.17% responded to tendinitis (Green), 11.67% responded to all of these (Blue). When asked about good health along with ergonomics. A vast majority of respondents to about 30.83% responded that regular exercise should be done (Red), 27.50% responded to proper nutrition (Yellow) and 22.50% responded with relaxation techniques, like meditation and yoga (Green), 14.17% responded to all of these(Blue).

On comparing gender and knowledge on the use of ergonomics in dentistry. The X-axis represents Gender and Y-axis represents the number of participants (Graph 1), who answered high productivity, avoidance of illness and injuries, increased satisfaction, and all of these. Out of 28 people who had answered high productivity, 9 constituted females, and 19 constituted males. Out of 41 who answered to avoid illness and injuries, 16 participants were female and 25 of participants were male. Out of 34 who had answered increased satisfaction, 11 constituted females and 23 constituent males. Out of 17 who answered all of these, 10 constituted females, and 7 constituted males. An association to gender and knowledge under discussion was found to be not significant by the Pearson chi-square test (chi-square value: 3.996, df-3, P-value = 0.262). Thus, statistically, the males and females have the same opinion and knowledge on the type of light preferred.

On comparing gender and knowledge on the common hand and wrist conditions involved (Graph 2). The X-axis represents Gender and Y-axis represents the number of participants who answered tendinitis, carpal tunnel syndrome, Guyon's syndrome, and all of these. Out of 29 people who had answered tendinitis, 10 constituted females, and 19 constituted males. Out of 41 who answered carpal tunnel syndrome, 15 participants were female and 26 participants were male. Out of 36 people who had answered Guyon's syndrome, 16 constituted females and 20 constituted males. Out of 14 who answered all of these, 5 constituted females, and 9 constituted males. An association to gender and knowledge under discussion was found to be not significant by the Pearson chi-square test (chi-square value: 0.844, df-3, P-value = 0.839). Thus, statistically, the males and females have the same opinion and knowledge on the type of light preferred.

Even when the posture is well established and originally adopted, it is almost difficult for dentists to maintain a relaxed posture during a lengthy clinical act of practice. Completely understanding the consequences of poor posture, dentists should strive for variations that are as unusual as possible, with a limited amplitude and a brief length (32). Stretching and strengthening the muscles that protect the back and spine, as well as those used in the forearm, wrist, and hand can help them stay strong and stable. Stretching at regular intervals during the workday. One of the most significant factors in avoiding regular resting hands (33). Musculoskeletal pain, especially back pain, has been identified as a significant health concern for dental practitioners. Early signs of MSDs include pain, inflammation, tenderness, numbness, and fatigue. MSDs have a greater chance of being dissatisfied at work. They are overloaded with anxiety and poor psychosomatic wellbeing, and as a result, they are less optimistic (34).

The limitations of the study include minimum articles referred and minimal sample size. The future scope of the study includes enabling one to create and analyze the knowledge about the type of mutation in genetics with a larger population.

## CONCLUSION

Effective use of ergonomics ensures maximum efficiency and prevents injuries or illnesses. The identification of risk factors and the application of ergonomic strategies are essential. Students have awareness of ergonomics and are knowledgeable of its contribution to workplace health. However, they are having difficulty adopting ergonomic postures.

## Conflict Of Interest

The authors have none to declare.

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