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ABSTRACT

Introduction : Magnification in general is considered one of the important revolutions in science, and specifically in dentistry. This Revolution allowed scientists to undertake main studies in the natural world and accelerate progress in the fields. Magnification also helps in the maintenance of ergonomic work posture in dentistry. The aim of this study was to assess the awareness, attitude, knowledge and practice of dental students towards use of magnification in dentistry.

Materials and Method : The Study setting used here is an online setting. The population taken for this study is 100 dental students from Tamil Nadu . The survey is conducted using a standardised questionnaire. Data was collected and tabulated. The data collection software used is SPSS software. The results of this study in terms of individual behavior and awareness of dental students towards use of magnification in dentistry are comparable with similar studies conducted in other countries. The MCQ type questions are prepared with choices with the help of google forms, and all the questions were shared. For this research 10 self structured questionnaires were created.

Results: In the current study the questionnaire was circulated on the basis of knowledge, attitude and practice. The data was collected and statistically analysed. 52% of the participants were female and 48% of the participants were male (Figure1). Majority of participants (70%) agreed that use of magnification devices in dentistry enhances visualization and improves ergonomics. (Figure 2). 14% of the participants agreed that Dental procedures have become complicated and hence the use of magnification in dentistry has attained a significant position. The analysis showed that the level of awareness among males and females was similar. Chi square value= 1.432; P value= 0.430 ($p > 0.05$, hence statistically significant).

Conclusion: The students participating in the study had adequate knowledge but the attitude and practice score were comparatively less. The recent developments in magnification work environments are a positive step towards operator comfort, but new ergonomic equipment has limited value without the critical analysis of current practice patterns.

Keywords: Attitude; Awareness; Dental student; Ergonomic work; Knowledge; Magnification loupes; Practice

INTRODUCTION

Magnification is generally considered as one of the most important revolutions in science, and specifically in dentistry. This Revolution mainly allows scientists to focus mainly on studies in the natural world and accelerate progress in the fields(1). The different idea of enhanced magnification was introduced to dentistry in the form of an operating microscope in 1978. The Dental Operating Microscope helps in different kinds of dental procedures(2). Regular use of a DOM in various dental specialties was advocated for caries diagnosis and excavation, crown margins and post placement, and furcation and perforation repairs(3). Despite the expensive cost and relatively long duration learning curve when starting using magnification tools in the different dental specialties, it is generally believed that their use should be advocated(4). They are becoming an important integral part of the era of modern microsurgery in various fields of dentistry for these years. Three primary advantages were identified in relation to the usage of magnification devices in endodontics, like enhanced visualization, improved working posture, and increased referral(5).

The clear advantage of using a DOM (Dental Operating Microscope) in dentistry, resulted in the Commission on Dental Accreditation re-quiring training(6). The American Association of Endodontics (AAE) stated that endodontics could have use of a DOM in the following procedures like detecting hidden canals, mainly the MB2 canal in maxillary molars, then retreatment cases where removing materials like obturation materials and posts in necessary, and also removing broken instru-ments, achieving proper conservative access through superior visualization of the pulp chamber and canal ori-fices, perforation repairs, and all steps of endodontic surgery(7). Students using magnification loupes worked faster, completed more teeth preparations, and also used computer-assisted evaluation less frequently, and demon-strated better overall performances. Endodontics is confined to a narrow operating space as it deals with miniscule anatomy(8). As a result, practitioners who manage intricate cases appear to have higher visual acuity. Over the years, many magnification devices have been introduced as bridging tools between the naked eyes and the microscope(9). In fact, tools, like an endoscope, magnifying glass, and even intraoral camera, have largely been superseded by contemporary devices that seem to be more practical and as well as convenient for application, like loupes and dental operating microscopes. This review gives several common types of magnification devices applied in the discipline of endodontics, the factors that influence their adoption, the advantages, and shortcomings, as well as the importance of using magnification devices for endodontics(10).

Magnification mainly helps in the maintenance of ergonomic work posture in dentistry, once these magnification lenses bring the operative field closer to professional(11). Loupes give a type of magnification and their use can promote higher quality on dental treatment(12). Among different factors that can encourage practitioners to use magnification devices are exposure to magnification devices by both demonstrations and dental conferences, and also by increasing awareness on the benefits of using such technology and health-related issues such as visual deterioration and musculoskeletal pain(13). Besides those advantages magnification can be good for musculoskeletal health maintenance for dental practitioners(14). Very few studies have been published on the topic of dental magnification among dental practitioners (15). Similarly, a recently conducted study on dental interns and final year undergraduate students, showed statistically significant improvement in the outcome of class II cavity prepara-tions for those using magnification loupes(16).Our team has extensive knowledge and research experience that has translate into high quality publications(17–26),(27–30),(31–35)(36). The aim of this study was to assess the attitude, knowledge and practice of dental students towards use of magnification in dentistry.

MATERIALS AND METHOD

The Study setting used here is an online setting. The population taken for this study is 100 participants from Tamil Nadu . The survey is conducted using a standardised questionnaire. Data was collected and tabulated. The data collection software used is SPSS software.The results of this study in terms of individual behavior and awareness of dental students towards use of magnification in dentistry are comparable with similar studies conducted in other countries. The MCQ type questions are prepared with choices with the help of google forms,and all the questions were shared. For this research 10 self structured questionnaires were created. Output variables can be risk factors, food habits, aged people. The sampling method used here is a convenient sampling method. Method of representation of data is Pie chart, Bar Diagram. Statistical tests used are Descriptive statistics. Independent variables can be Age, Weight, Gender, Risk factors, crown margins and post placement, Neuronal Network and Deep Learning. dependent variables can be awareness, interaction, knowledge, attitude, practice. This study is approved by the Institutional Review Board, Saveetha Dental College, Chennai. Statistical tests used are Descriptive statistics. Independent variables can be Age, Gender, Risk factors, treatment techniques, advanced sharp instruments. Dependent variables can be awareness, interaction, knowledge, attitude, perceptions.

RESULTS

In the current study the questionnaire was circulated on the basis of knowledge, attitude and practice. The data is collected and statistically analysed. 52% of the participants were female and 48% of the participants were male. Majority of participants (70%) agreed that use of magnification devices in dentistry enhances visualization and improves ergonomics. 14% of the participants agreed that Dental procedures have become complicated and hence the use of magnification in dentistry has attained a significant position. 70% agreed that application of magnification in endodontics has yet to be introduced into mainstream practice due to various influences in behavioral patterns (Figure 1). 18% of participants felt that surgical microscopes provide much greater magnification, higher optical performance when matched with normal dental loupes (Figure 2). 30% of participants are aware that application of magnification devices in endodontics is mainly meant for visual enhancement and improved ergonomics (Figure 3). 60% of participants were aware that Microscope provides 400 times more visual accuracy than the naked eye and 100 times the visual information than traditional dental loupes (Figure 4). 34% of participants experienced that Dental loupes aid dentists, hygienists, and dental therapists to devise accurate diagnoses of oral conditions (Figure 5). 45% of participants agreed that use of

magnification in dentistry appears to be of increasing interest. Majority of females (25%) and males (23%) knew that the application of magnification devices in endodontics is mainly meant for visual enhancement and improved ergonomics (Figure 6). Majority of males (33%) and females (17%) knew that surgical microscopes provide much greater magnification, higher optical performance when matched with normal dental loupes (Figure 7).

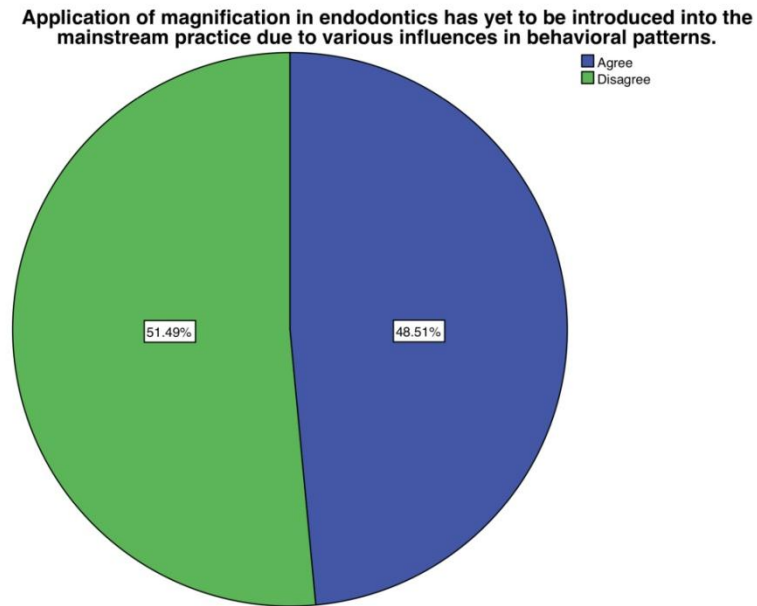


Figure 1: Pie chart showing percentage distribution of responses for statement application of magnification in endodontics has yet to be introduced into mainstream practice due to various influences in behavioral patterns. 52%- Disagree (blue); 48% - Agree (green). Majority of participants (52%) agreed that the statement's application of magnification in endodontics has yet to be introduced into mainstream practice due to various influences in behavioral patterns.

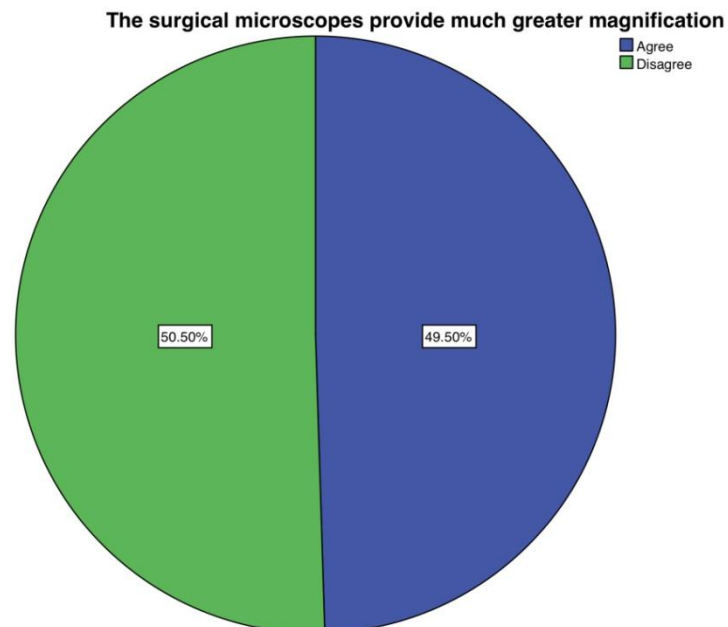


Figure 2: Pie chart showing percentage distribution of responses for the statement surgical microscopes provide much greater magnification. 51%- Disagree (blue); 49% - Agree (green). Majority of participants (51%) disagreed with the statement that surgical microscopes provide much greater magnification.

The use of magnification devices in dentistry enhances visualization and improves ergonomics.

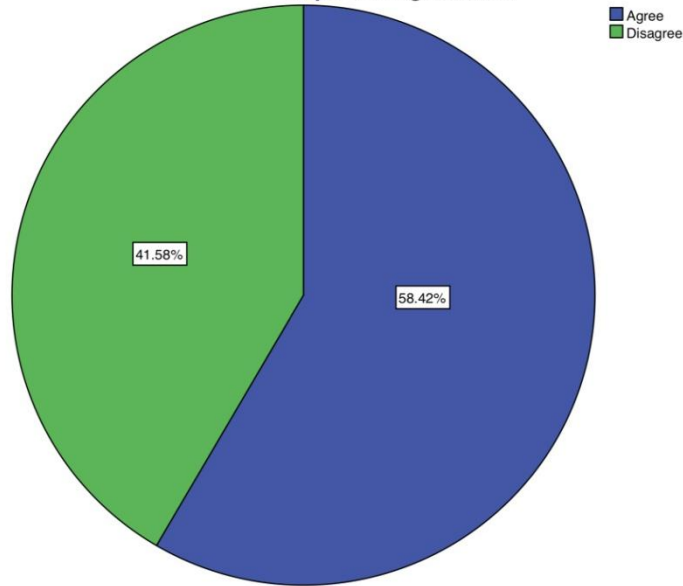


Figure 3: Pie chart showing percentage distribution of responses for involvement of knowledge about the use of magnification devices in dentistry enhances visualization and improves ergonomics. 42%- Disagree (blue); 58% - Agree (green). Majority of participants (58%) agreed with use of magnification devices in dentistry enhances visualization and improves ergonomics.

The Microscope provides 400 times more visual accuracy than the naked eye and 100 times the visual information than traditional dental loupes.

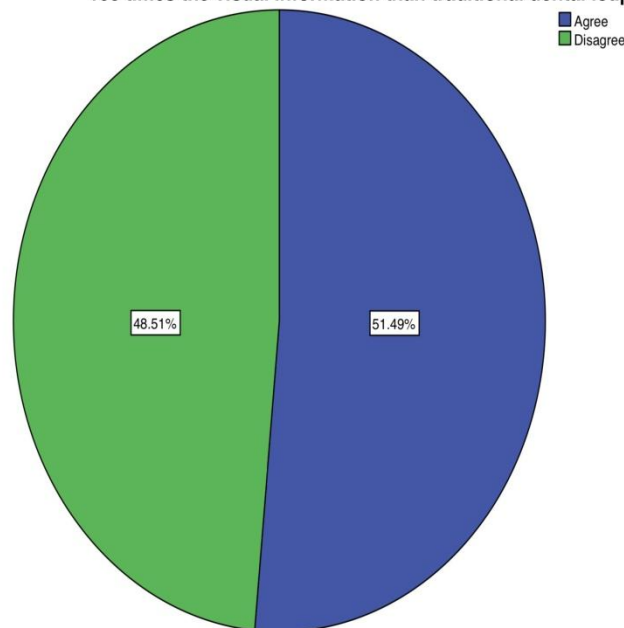


Figure 4: Pie chart showing percentage distribution of responses for involvement of knowledge that microscope provides 400 times more visual accuracy than the naked eye and 100 times the visual information than traditional dental loupes. 48%- Disagree (blue); 52% - Agree (green). Majority of participants (52%) agreed that the microscope provides 400 times more visual accuracy than the naked eye and 100 times the visual information than traditional dental loupes.

Dental loupes aid dentists, hygienists, and dental therapists to devise accurate diagnoses of oral conditions

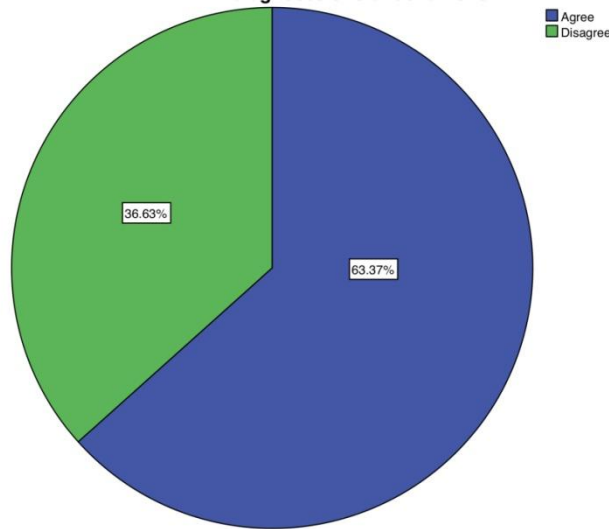


Figure 5: Pie chart showing percentage distribution of responses for dental loupes aid dentists, hygienists, and dental therapists to devise accurate diagnoses of oral conditions. 37%- Disagree (blue); 63% - Agree (green). Majority of participants (63%) agreed that dental loupes aid dentists, hygienists, and dental therapists to devise accurate diagnoses of oral conditions.

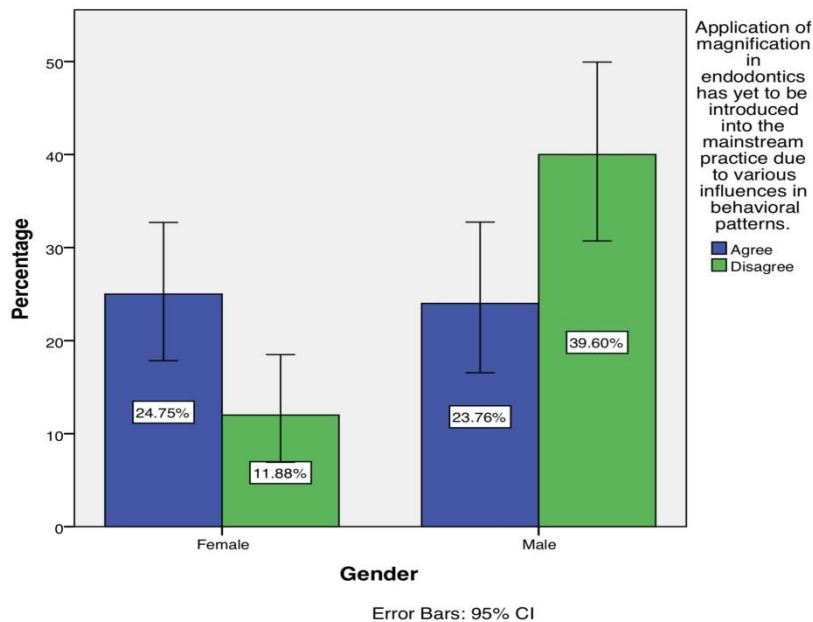


Figure 6: Bar graph showing the association of responses based on different gender to the awareness on application of magnification, where blue denotes agree and green denotes disagree. X axis represents gender and Y axis represents percentage. Out of 100 participants, 25% of females reported that application of magnification devices in endodontics is mainly meant for visual enhancement and improved ergonomics, whereas only 23% of male reported that application of magnification devices in endodontics is mainly meant for visual enhancement and improved ergonomics. Majority of females (25%) and males (23%) knew that the application of magnification devices in endodontics is mainly meant for visual enhancement and improved ergonomics. The analysis showed that the level of awareness among males and females was similar. Chi square value= 1.543; P value= 0.840 ($p > 0.05$, hence statistically significant).

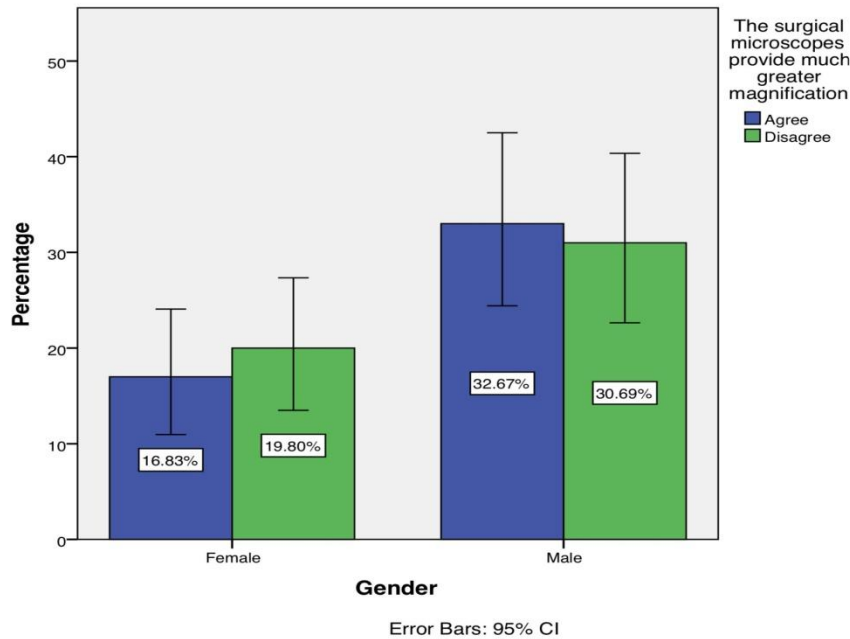


Figure 7: Bar graph showing the association of responses based on different gender to the awareness of surgical microscopes providing greater magnification, where blue denotes agree and green denotes disagree. X axis represents gender and Y axis represents percentage. Out of 100 participants, 17% of females reported that surgical microscopes provide much greater magnification, higher optical performance when matched with normal dental loupes, whereas only 33% of male reported that surgical microscopes provide much greater magnification, higher optical performance when matched with normal dental loupes. Majority of males (33%) and females (17%) knew that surgical microscopes provide much greater magnification, higher optical performance when matched with normal dental loupes. The analysis showed that the level of awareness among males and females was similar. Chi square value= 1.432; P value= 0.430 ($p > 0.05$, hence statistically significant).

DISCUSSION

The use of latest equipment is reflective of clinicians as being more professional and also skillful. As patients believe and confidence are established, more word-of-mouth referrals will ensue(37). A camera can be fixed to the microscope to enable the clinician to take high resolution photos to give a lecture on the case prognosis(2). This may help in faster understanding among patients towards the proper treatment plan(4). Many reported disadvantages are the acclimatization period of the latest working environment, the high cost of the magnification device and its related accessories, additional steps for infection control, as well as a potential sharp injury at the workplace(38).

Previous studies by Mamoun JS et al, argue that high-powered magnification (4x-6x or more) provides substantially more visual information for diagnosing and gives treatment for dental pathology when compared to the use of basic level is 2.5x magnification. In all phases of general dentistry, the increased visual detail provided by high magnification reduces ambiguity in both diagnosis and treatment decision-making(39). The costs of both loupe and microscope are considered impractical, particularly in developing nations(40). The separate lighting system that needs to be attached with the loupe and small size surgical instruments may also incur an added cost(5). The use of high volume suitable working distance is imperative to minimize contamination. Protective outer cover placed on the loupe which prevents the lenses from scratching. Surface debris on the lenses can be removed with gentle blowing and blotting(8). Sharp injuries can occur due to the careless use of loupes during dental procedure. Passing skills must be well-coordinated between the clinician and the assistant to avoid injuries(41).

Very little numbers of studies have been published on the topic of dental magnification among dental practitioners(42). Similarly, a recently conducted study on dental interns and final year undergraduate students, showed statistically significant improvement in the outcome of class II cavity preparations for those using magnification loupes(43).

Furthermore, when endodontic microsurgery is performed under magnification with modern microsurgical methods, the success rate is 94%, as opposed to 59%, when performed with neither magnification nor cutting-edge instruments(44). Teleconsultation may also turn into a reality by live communication whenever there is a use of these magnification devices gains high acceptance by dental practitioners.

CONCLUSION

The recent developments in magnification work environments are a positive step towards operator comfort, but new ergonomic equipment has limited value without the critical analysis of current practice patterns. From this survey, we can conclude that most dental students are aware of the importance of magnification. Their attitude and practice scores are though lesser compared to the knowledge scores.

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Conflicting Interest

Authors have declared that no competing interests exist.

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