

Knowledge and Attitude of Choosing Dental Loupes among Dental Students - A Questionnaire Survey

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Abstract: Background: A loupe is a simple, small magnification device which is used to see small details more closely and clearly. Dental loupes aid dentists to devise accurate diagnose of oral conditions and enhance surgical precision when completing treatment. Dental loupes are binocular and usually take on the form of a pair of glasses. Some dental loupes are flip types and other types are inset within the lens of the glasses. In dentistry typical magnification is 2.5x, but dental loupes can be in the range from 2x to 8x. Aim and Objective: To assess the knowledge and attitude of choosing the qualified loupes for dental practice among dental students. Methods: The subject was seated comfortably, the questionnaire was handed over and the following instruction was given. "Kindly read each of the following statement and alternative responses, then you have to select the one most suitable response of them and tick against the selected response in the sheet. Kindly give the response for all the statements. Results: Out of 102 students, almost all of them have the knowledge about the dental loupes and how to use them as it is mandatory in Saveetha Dental College to practice with dental loupes. 43% of the students are aware about the three ergonomic factors to be considered while choosing the dental loupes. Conclusion: This research is done to create awareness among dental students to choose the best recently advanced loupes and those having better characteristics for improved dental practices.

Keywords: Loupes, magnification

1. Introduction

A loupe is a type of magnification device used to see things more closely. A loupe is a form of a modified microscope, allowing the user to be able to apply the phenomena of microscopy to his or her trade. Through the two systems of lenses which include Galilean and Kepler's optical system being used for the production of telescopic glasses, magnification is achieved. The Galilean optical system involves convex and concave lens, while the Kepler's telescopic system involves two convex lenses [1]. Magnifying loupes are used in detecting the carious lesions in initial stage with optimum efficiency [2]. About 60-80% of dentists experience chronic back and neck pain due to their improper working posture [3]. The typical magnification of dental loupe is 2.5x [4]. Magnification strength for general dentists is 2.5x to 3.5x; for endodontists/periodontists is 3.5x to 4.5x or higher [5].

Loupes are used by dentists to enhance visual acuity, treatment quality, to improve working posture and comfort. There are three essential ergonomic factors which are to be considered while choosing the dental loupes. They are working distance, declination angle, and frame size. The dental loupe should also provide a forward head posture of 20 degrees or less. Considering the three ergonomic factors while choosing the loupes enhances the musculoskeletal health and career longevity [5].

Commercially, there are two types of loupes available. They include Through The Lens (TTL) loupes and flip-up loupes. TTL loupe have the optics built into the glasses and also includes the specifications such as inter-pupillary distance customized to your eyes. Flip up loupes have the optics attached to a moveable arm, and can be manually adjusted. While buying a loop, one has to consider the magnification, resolution, depth of field and field of view [6].

2. Materials and Methods

- **Subject:** Undergraduate dental students in 3rd and 4th year of study.
- **Materials:** Questionnaire survey on Knowledge and Attitude of choosing dental loupes
- **Procedure:** The subject was seated comfortably. The questionnaire was handed over and the following instruction was given. "Kindly read each of the following statement and alternative responses, then you have to select the one most suitable response of them and tick against the selected response in the sheet. Kindly give the response for all the statements."

3. Result

The results obtained revealed that all of them had the knowledge about the dental loupes and how to use them. From the survey, it has been found that 5% of the students use Through The Lens (TTL) type of dental loupes and 95% use flip types. 52% of the students had the knowledge about the typical magnification used in dentistry. We have found that students prefer loupes mounted with light as they feel comfortable and good vision compared to ordinary one. 59% of the students are aware about the recent advances in dental loupes like camera mounted loupes which are used for recording and clear diagnosis. There is different magnification used for various procedures in dentistry. The magnification used in endo, crown and bridge work was found to be 3.5x-4.0x. 81% of the students use the dental loupes for both ergonomic and optical benefit. Out of 100 students, 46 students have the knowledge about TTL loupes that it can be customized based on working distance and interpupillary distance and 54 students know that they have the larger field of view. Increase in magnification leads to decrease in field of view and steeper learning curve and 32% of the students were aware about this. Considering the frames

used, the comfort level was higher with titanium frames (50%), followed by carbon frames (32%) and plastic frame (15%). 43% of the students are aware about the three ergonomic factors to be considered while choosing the dental loupes.

4. Discussion

The study examined the knowledge and attitude of choosing dental loupes among undergraduate students. It has been observed that students are aware of how to use the dental loupes and about choosing the best dental loupe. Bethany Valachi states that three ergonomic factors to be considered while choosing dental loupes include 'Working distance' which may lead to excessive neck flexion if not maintained, 'Declination angle' which is the angle the eyes are inclined downward toward the work area and it should be steep enough to help to attain a comfortable working position with minimal forward head posture (20 degrees or less), and last is the 'Frame Size' where small oval frames are popular nowadays [5]. According to a study by Chun-Hung Chu et al., magnifying loupes were used to improve the operator's ability to visualize the extent of the lesion. Thus, better access to the carious lesion may be possible, and more thorough caries removal may result by using the loupes [7]. According to Jayashri Prabakar, there is high prevalence of caries in primary dentition than in permanent dentition [8]. So dental loupes help in better magnification of the caries. Our study is in contrast with the study done by Saad A Khan and Kwai Yee Chew in which only 19% of the students reported using dental loupes during clinical work and 92% of the students were unaware about the ergonomics in dentistry [9] while 100% of the students use dental loupes during clinical work and 43% of the students were aware about the ergonomics in our study respectively. Wearing loupes provided better working posture according to Peggy Maillet [10]. According to an article by dental students of King's Dental College, London, the criteria's one should consider while choosing a dental loupe is 'Magnification' of 2.5x, 'Resolution' which is the ability of the loupes to distinguish between two closely spaced objects, 'Depth of field' which should be maintained to reduce fatigue and 'Field of view' whose ideal view is 7cm for 3.5x magnification [6]. So we should consider the following while choosing a loupe: Choosing correct magnification and working distance, straight black line observation, testing magnification, testing working distance, checking field of view, checking depth of view, compare with prescription lens and finally test the weight of the loupe. According to a study in UK, the students prefer using TTL type of loupes with light source and 2.5x magnification [11]. Iris Urlic in his study has concluded that higher visual acuity were recorded by the use of Galilean telescope system than by the unaided eyes. He has measured the influence of Galilean loupe system on near visual acuity of dentists and concluded that Galilean telescope with 2.5x magnification improved visual performance in clinicians [1]. From a study, the Galilean loupes are recommended to those dentists who haven't used the loupes for their clinical routine and also it is easy for practice [12]. Caries risk assessment should be included as a preliminary dental examination [13]. So using the loupes, this process can be enhanced. According to Congdon L M, loupes has the following advantages of 93%

of improvement in ergonomic factors, 90.3% of more quality of measurement by periodontal probe, 69.6% of improved caries detection, 69.6% enhanced restorative evaluation, 59.5% of improved patient care [14]. Dental loupes should be used for some couple of hours during initial days of usage and increasing the hours during progressing usage and thus avoiding complications [5].

5. Conclusion

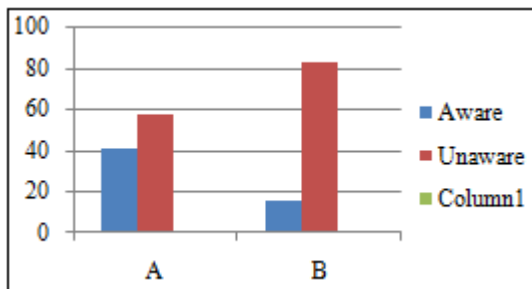
Dental loupes can enhance the dentist's working efficiency. The present study reveals the knowledge and attitude of choosing dental loupes among undergraduate dental students of 3rd and 4th year. It has found that more than 50% of the students are aware about the criteria's to be considered while selecting a loupe.

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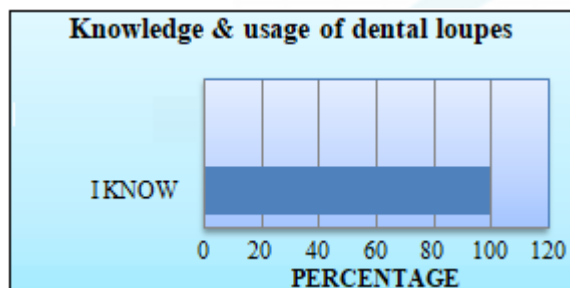
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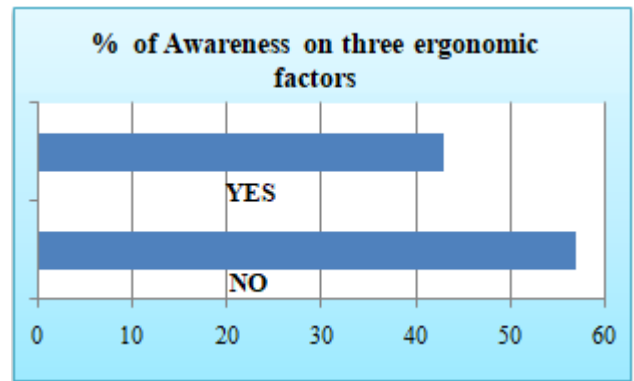
Figures



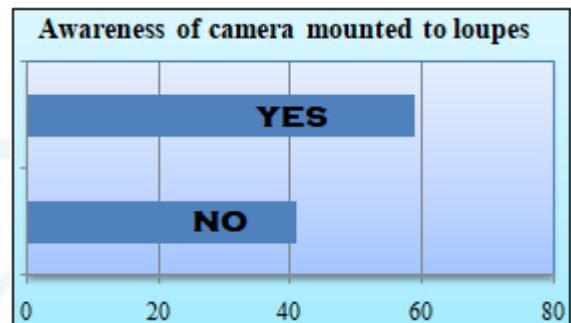
Graph 1: Awareness about magnification
 A-Typical magnification used in dentistry (2.5x)
 B-Recommended magnification for loupes in endo, crown and bridge work (3.5x-4.0x)



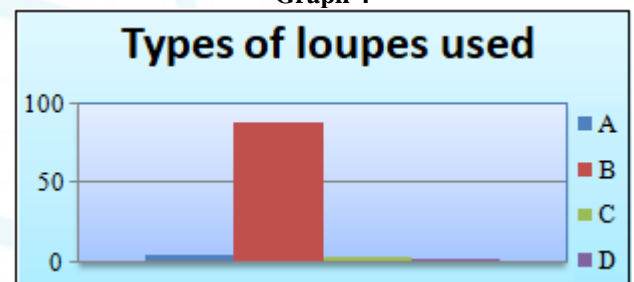
Graph 2



Graph 3



Graph 4



Graph 5

A-TTL, B-Flip up C-Galilean D-Prismatic

Questionnaire:

S.No.	Questions	Options			
1	Do you know what is Dental loupes?	A)Yes	B)No		
2	Do you know how to use a dental loupe?	A)Yes	B)No		
3	What type of dental loupes you use?	A)TTL	B)Flip-up		
4	Do you know what is the typical magnification used in dentistry?	A)Yes	B)No		
5	Which type you feel comfortable with?	A)Light mounted loupe	B)Ordinary loupe		
6	Are you aware of recent advances of camera mounted to loupes for recording and clear diagnosis?	A)Yes	B)No		
7	What is the recommended magnification for loupes in endo, crown and bridge work?	A)3x-3.5x	B)3.5x-4.0x	C)4.0x-4.5x	
8	Why should you get loupes for?	A)Ergonomic benefit	B)Optical benefit	C)Both	D)None of them
9	Loupes customised based on working distance and interpupillary distance is?	A)TTL	B)Flip up		
10	Large field of view is obtained in?	A)TTL	B)Flip-up		
11	Increase in magnification leads to?	A)Decrease in field of view	B)Steeper learning curve	C)Both	D)None of them
12	What type of frame you feel comfortable with?	A)Plastic	B)Titanium	C)Carbon	D)Others
13	Three ergonomic factors one should consider for choosing loupes include:	A) Working distance, declination angle, frame size	B) Working distance, magnification, declination angle	C)Magnification, frame size, declination angle	D) Field of view magnification, working length