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KNOWLEDGE AND AWARENESS ABOUT INTRAORAL SCANNERS AMONG DENTAL STUDENTS

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ABSTRACT

Digital dentistry refers to the use of dental technologies or devices that incorporate digital or computer controlled components to carry out dental procedures rather than using mechanical or electrical tools. Intraoral scanners are the devices used to capture direct optical impression. The scanner projects a light source onto the area to be scanned. The images are captured by image sensors and are processed by scanning software, which then produces 3D surface models. The aim of the study was to evaluate the knowledge and awareness of intraoral scanners among the students of Saveetha dental college, Chennai. The students had a good level of knowledge and awareness about the use of intraoral scanners. 80% of the population were aware of the clinical uses of intraoral scanners. 91.6% of the population felt that they reduce the patient discomfortness. It can be concluded that the intraoral scanners are time saving instruments and are easy to use.

Keywords: Intraoral Scanners, Digital dentistry, Digital impression, Optical impression, Dental impression

1. INTRODUCTION

Digital impression is a virtual scan that generates a map of teeth. The optical impressions have a few points of interest over regular impressions among them, the significant is the decrease of patient pressure and inconvenience. Numerous patients today have anxiety and a gag reflex for conventional impression procedures, in these cases utilizing light to substitute tray and materials is an ideal solution **[1]**. Digital/ optical impressions also are time effective and simple clinical method for the dentists, particularly for uncooperative patients **[2]**. Furthermore, digital optical impressions replaces the concept of plaster models, reduces working time and allows better communication with dental technicians **[3]**. Intraoral scanners improve communication with patients also and are in this way a powerful marketing dental device for the advanced dental clinics or hospitals **[4]** . On the other hand, the disadvantage of utilizing digital impressions are the difficulty in finding out the deep marginal lines in prepared teeth or errors associated in case of bleeding **[5]**. Digital impressions when compared with conventional impressions, are similarly precise for single restorations or 3-4 unit crowns and bridges. Conventional impressions seems to be the best option at present for fixed full arch replacements of teeth by means of bridges and implants and in cases multiple teeth replacement, with a higher number of prosthetic abutment **[6]**. The intraoral scanners presently available may also differ in terms of accuracy with respect to different brands **[7]**.

There are certain significant aspects to be considered before purchasing an intraoral scanner, for example, the requirement for opacification, checking speed, wand measurements and possibility of getting in-coloured pictures or images. In fact the intraoral scanners can be incorporated in a closed system, creating exclusive records just or can be open, delivering documents that can be opened utilizing any CAD software. There will be more prominent adaptability of utilization of intraoral scanners in future. The intraoral scanners can be utilized for orthodontic diagnosis and treatment planning. It rapidly examines the occlusal surfaces of maxilla and mandible [8]. Previously our team had conducted numerous clinical trials **[9-13]** and lab and in- vitro studies **[14-17]** and systematic reviews and surveys **[18-20]** over the past 5 years in various topics related to prosthetic dentistry. This survey was done to evaluate the knowledge and awareness of advanced dental

devices, that is intraoral scanners among students of Saveetha Dental College, Chennai.

2. MATERIALS AND METHODS

The method involved in the survey was an online survey of questionnaires, which involves the awareness and knowledge about the intraoral scanners among undergraduate and postgraduate students of Saveetha Dental College, Chennai. The total number of participants was 210. A questionnaire was prepared as a set of 15 questions. The data was collected from the filled questionnaires and was entered in Microsoft Excel spreadsheet. The statistical program SPSS was used for data management and analysis. The method of representation of the results was by means of pie charts and the statistical analysis had been done.

3. RESULTS AND DISCUSSION

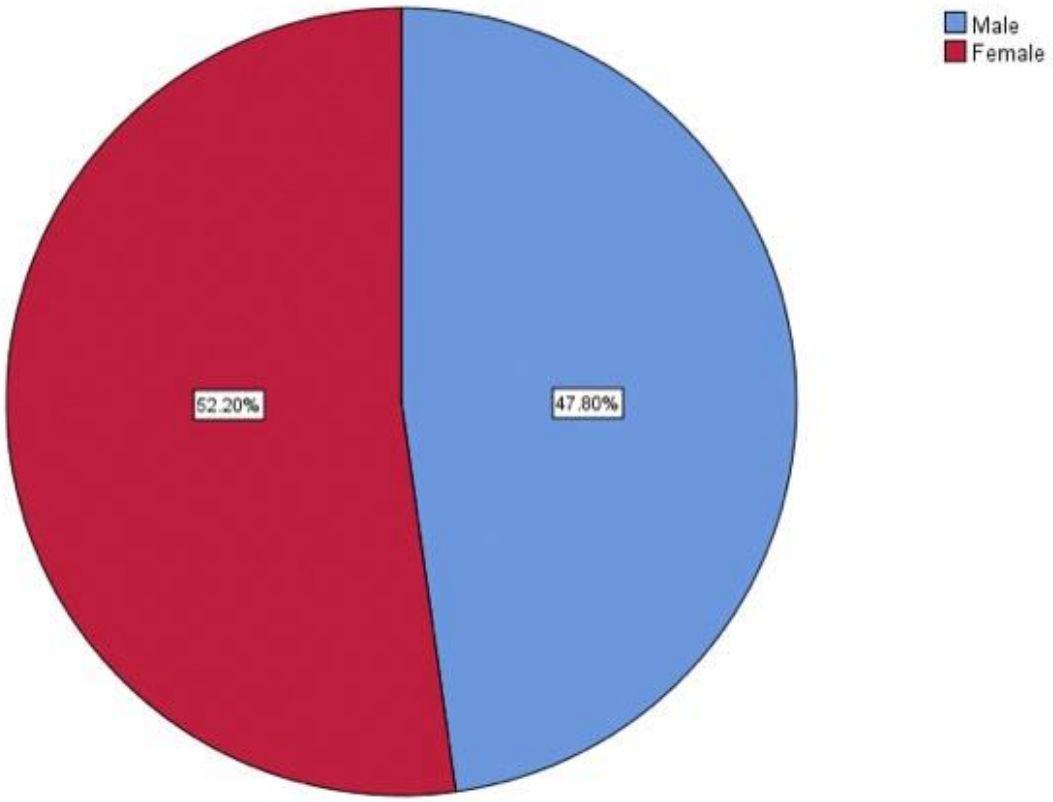

Fig 1: Pie chart represents gender where red colour denotes (52.2%) female and blue colour denotes (47.8%) males.

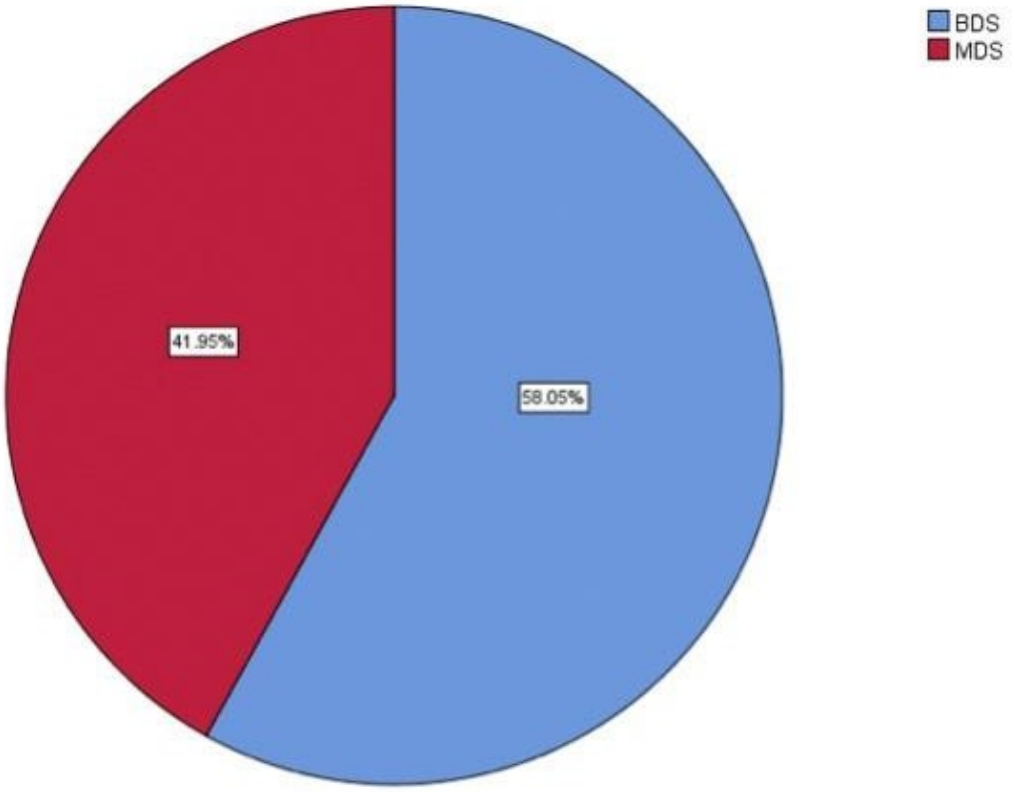

Fig 2: Pie chart represents the graduation of students where blue colour denotes (58%) undergraduate students, red colour denotes (42%) post graduate students.

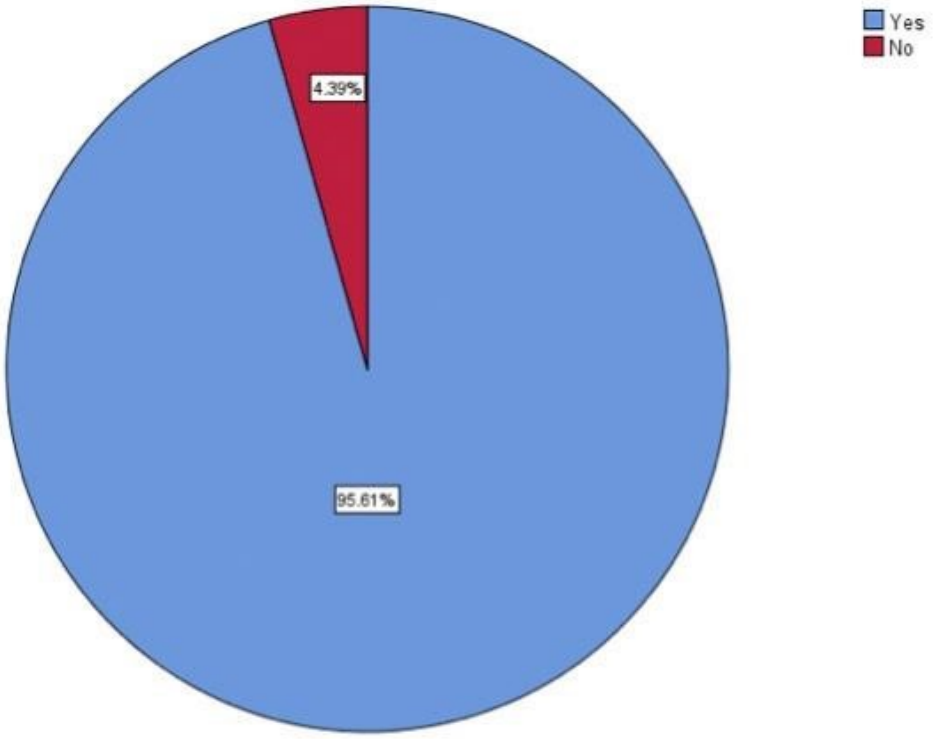

Fig 3: Pie chart represents awareness of intraoral scanners where blue colour denotes (95%) students are aware of intraoral scanners and red colour denotes (4.4%) not aware.

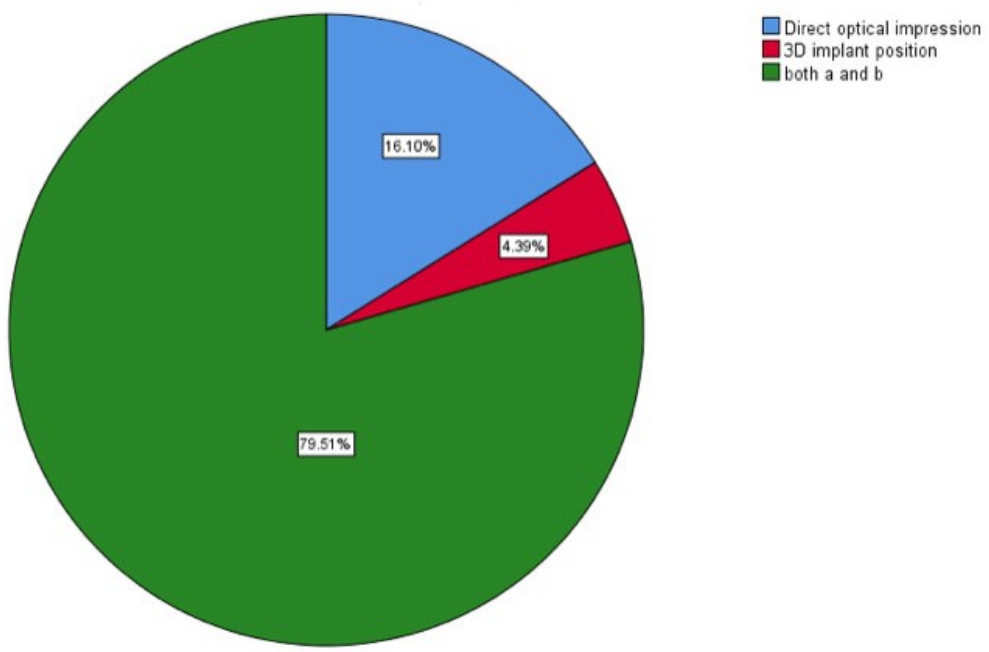

Fig 4: Pie chart represent the responses about the uses of the intraoral scanners, blue colour denotes the intraoral scanners are devices for capturing direct optical impression(16.1%), red colour denotes they are the device for capturing 3D implant position(4.4%), green colour denotes the population who answered the both(79.5%), the majority of the study population agreed with both.

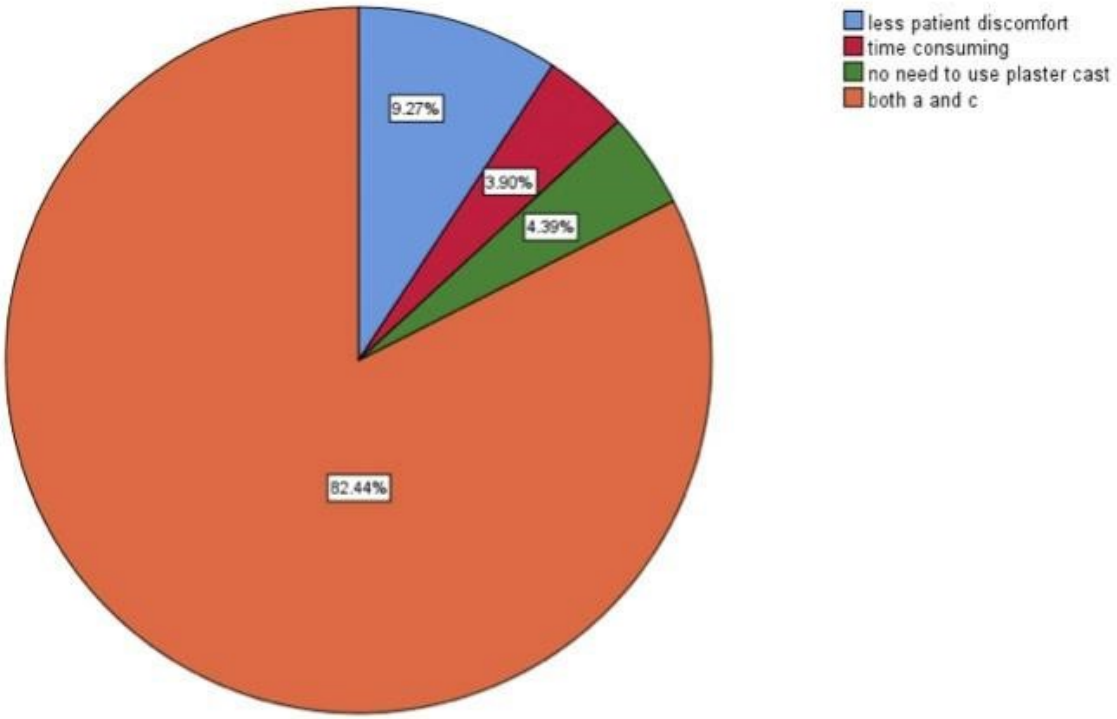

Fig 5: Pie chart represents the responses for the advantages of intraoral scanners Blue colour denotes the advantages of intra oral scanners will be less patient discomfort (9.3%), green colour denotes no need to use plaster cast (4.4%), orange colour denotes both less patient discomfort and no need to use plaster cast (82.4%), red colour denotes time consuming (3.9%)

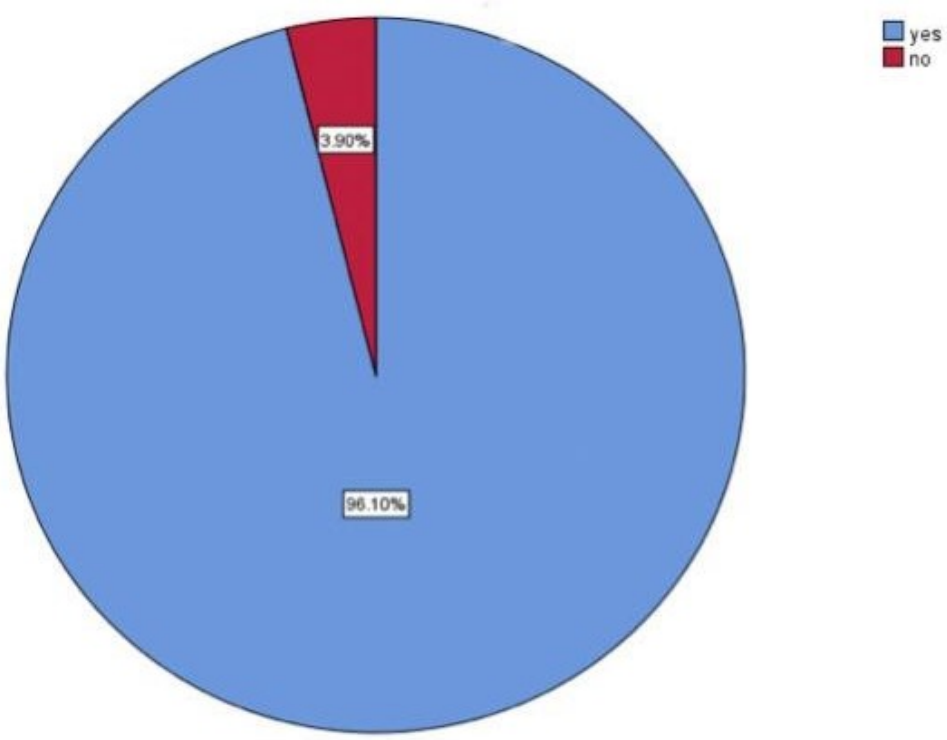

Fig 6: Pie chart denotes the responses about the awareness of intraoral scanners which aid better communication with patients/ dental technicians, blue colour represents that students agree that intraoral scanners aid in better communication with patients(96.1%), red colour denotes the population disagreed with the statement (3.9%).

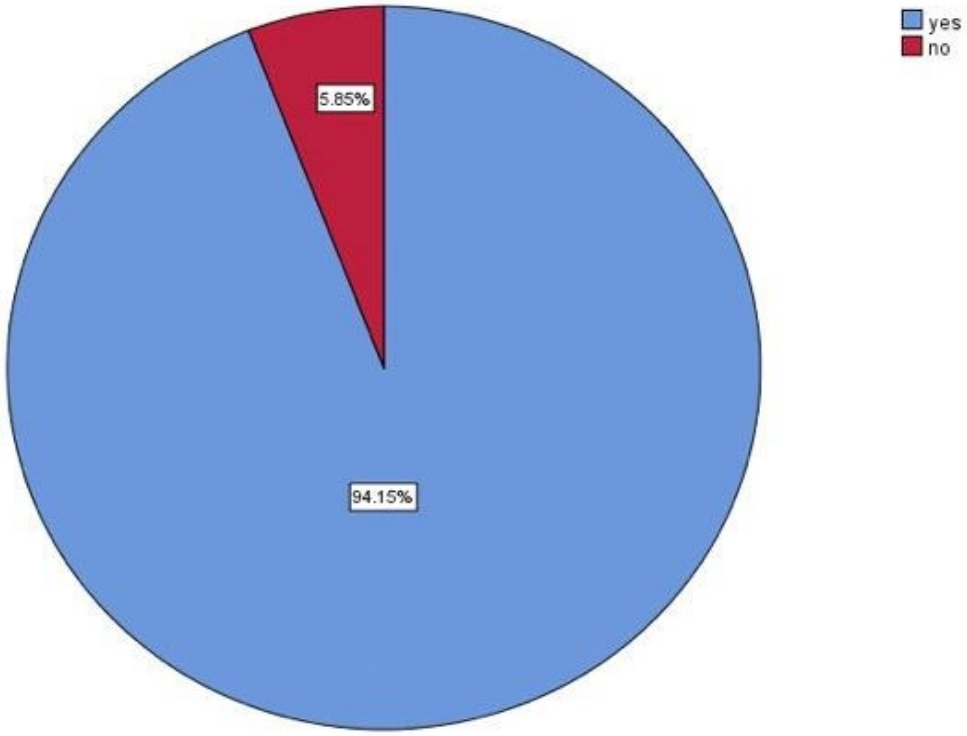

Fig 7:Pie chart represents the responses for the detection of deep marginal lines using intraoral scanners, blue colour denotes the population who thinks that the intra oral scanners detect deep marginal lines of prepared teeth(94.1%), red colour represents the population answered that they are instruments which does not able to detect deep marginal lines(5.9%).

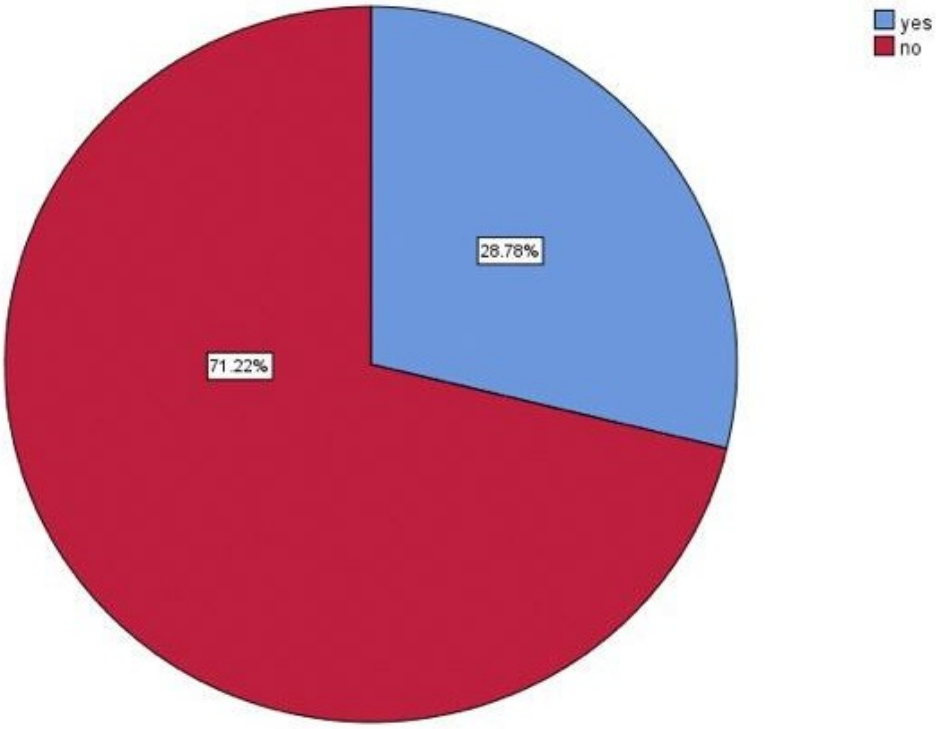

Fig 8: Pie chart represents the responses for the question that the older clinician with less experience and no passion for technological innovation can adapt to the intraoral scanner devices: red colour denotes the population thinks that it is very hard for older clinicians with less experience and no passion for technological innovation can adapt to the device(71.2%), blue colour denotes the population does not agree with the statement (28.78%).

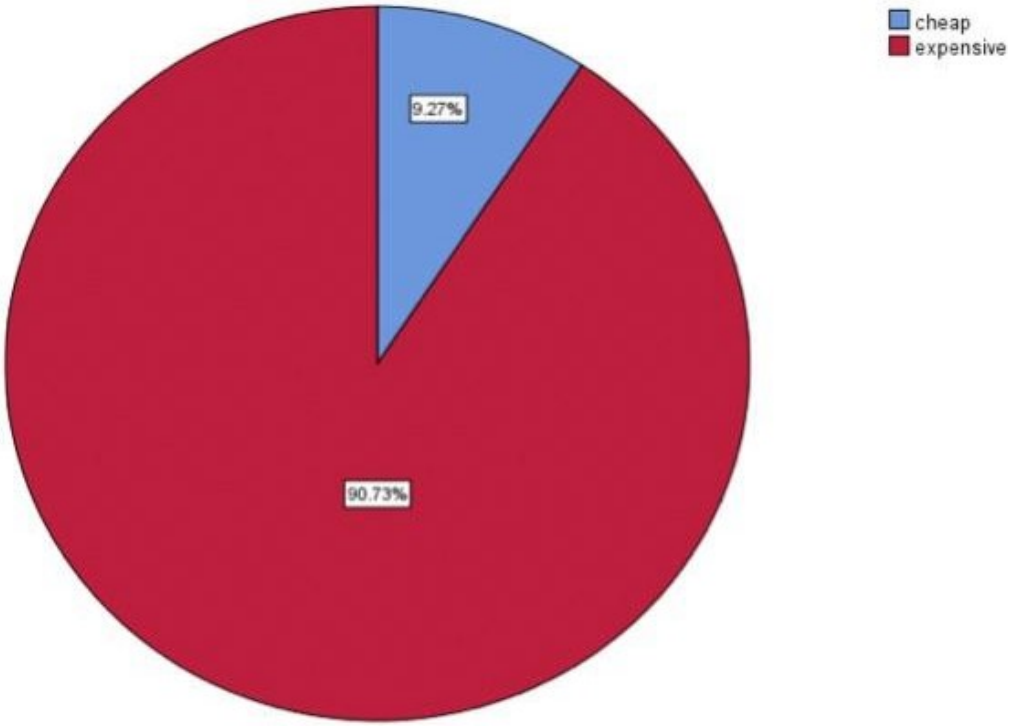

Fig 9: Pie chart represents the responses, about the purchasing and managing cost of intraoral scanners: red colour represents the population says that the purchasing and managing cost for the device will be expensive(90.7%) and blue colour denotes the population who says that it is cheap(9.3%).

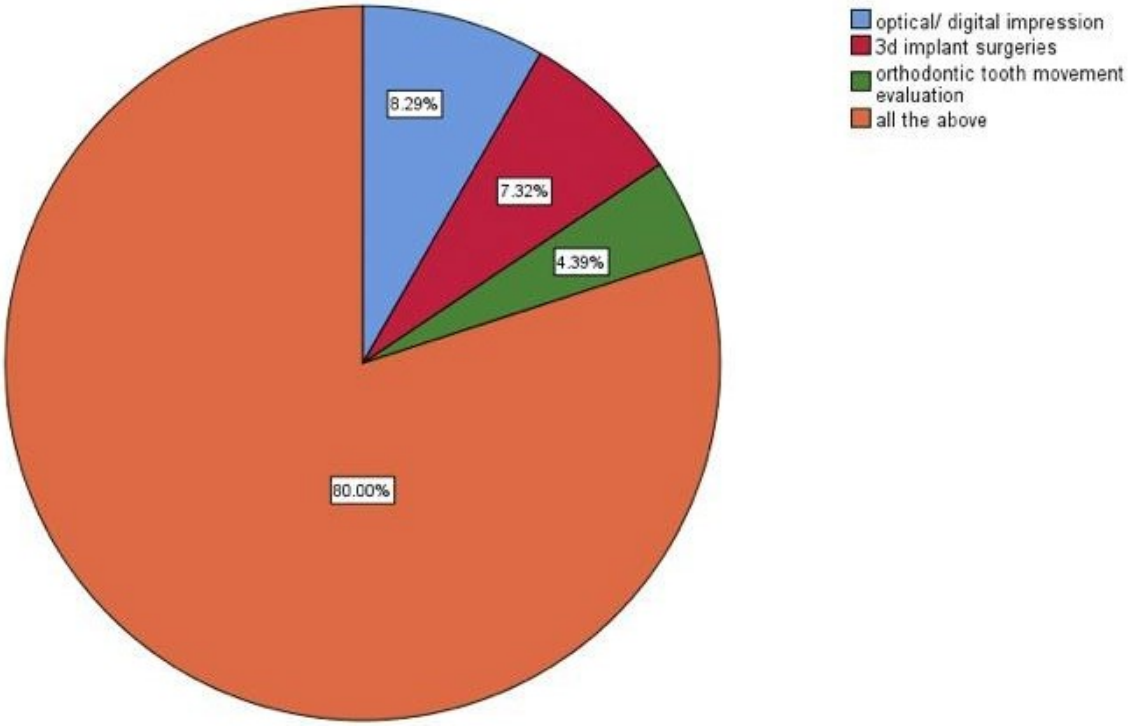

Fig 10: Pie chart represents the responses for the use of intraoral scanner; in which green colour denotes intra oral scanners can be used for orthodontic tooth movement evaluation (4.4%), red colour denotes 3D implant surgeries (7.3%), blue colour represents optical/digital impression (8.3%) orange colour represents all the above(80%)

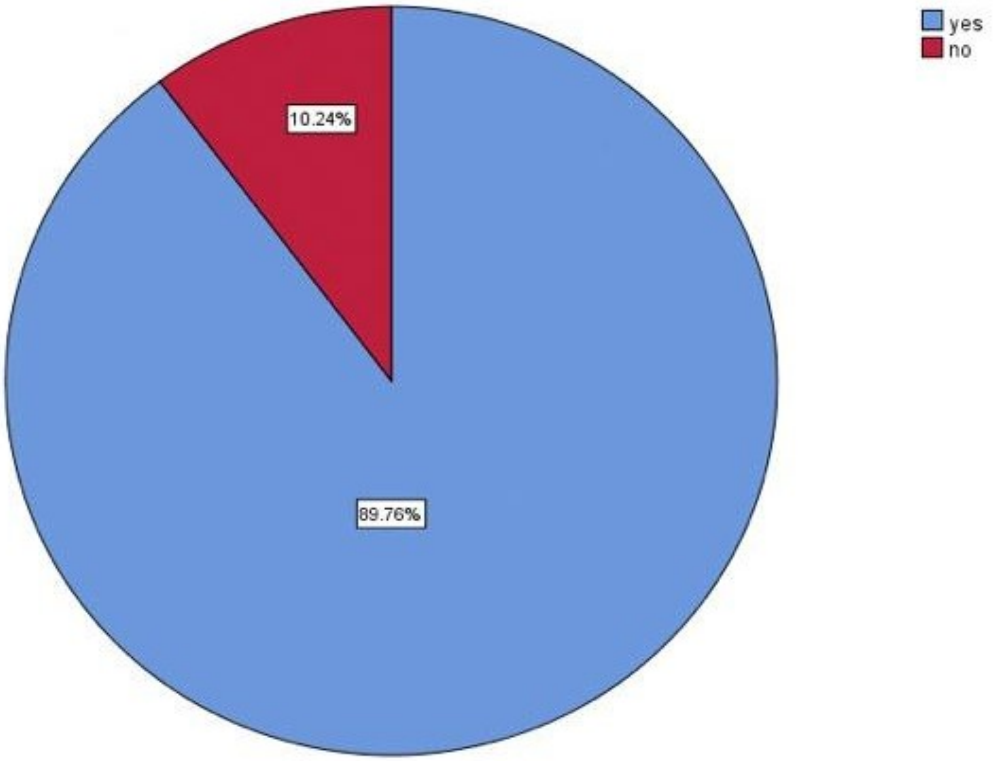

Fig 11: Pie chart represents the responses, for whether the intraoral scanners are time saving instruments: blue colour denotes (89.8%) the population who think that intra oral scanners are easy to use and time saving, red colour denotes (10.2%) the population who disagree with the statement.

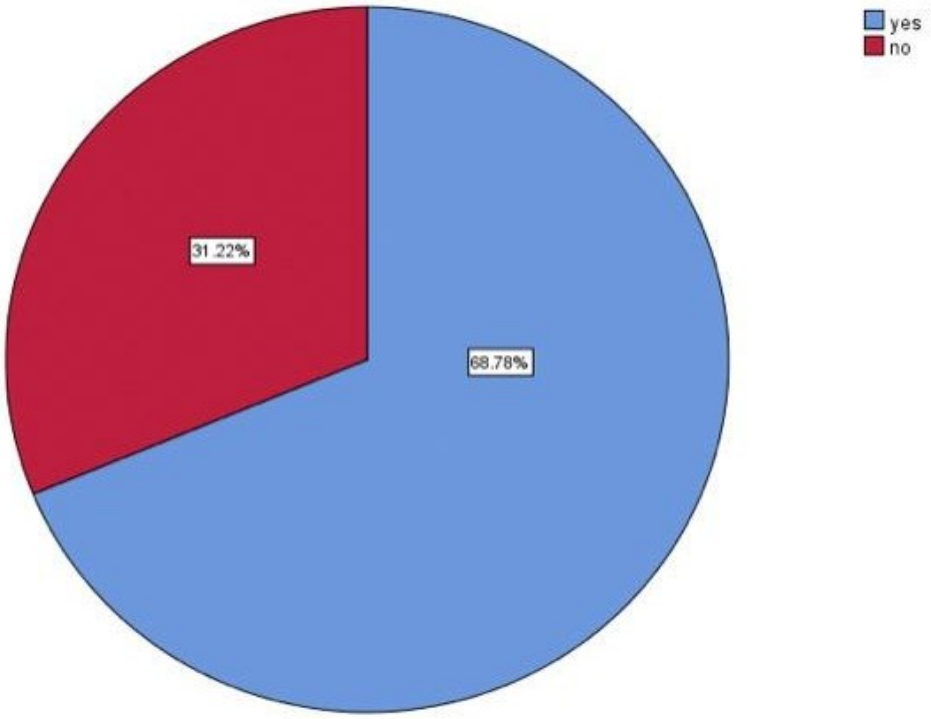

Fig 12: Pie chart represents the responses, for the question whether the students have used intraoral scanners before for any clinical procedures, blue colour denotes (68.8%) the percentage of students used intraoral scanners before for clinical procedures, red colour denotes (31.2%) the percentage of students not used this device before for any clinical procedures.

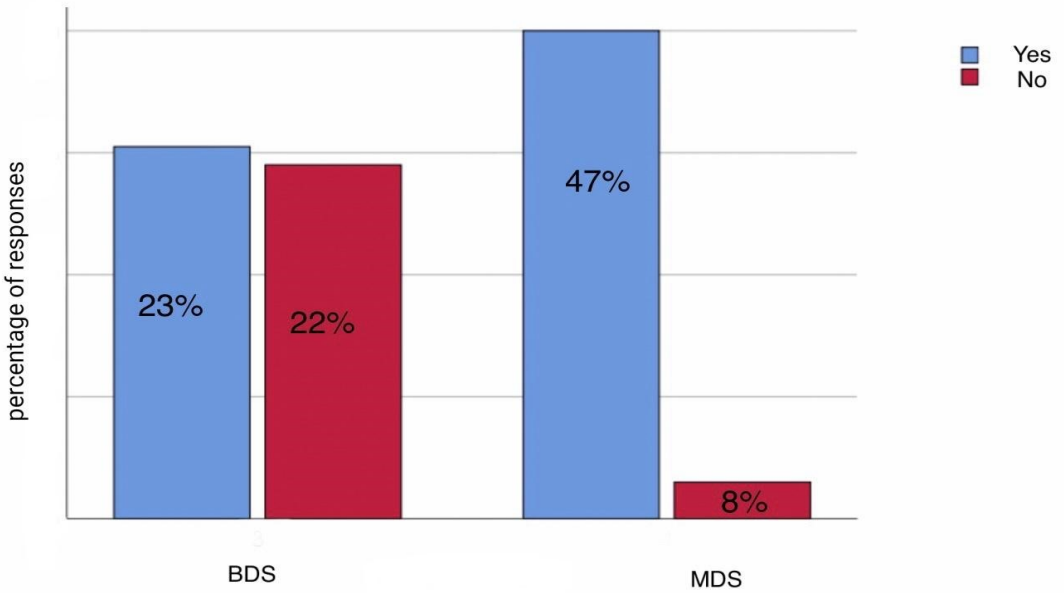

Fig 13: Bar graph showing the association between the qualification and the usage of intraoral scanners. Majority of MDS students (47%) have used intraoral scanners when compared to the BDS students and the difference is also significant statistically. P value 0.000<0.05, hence statistically significant.

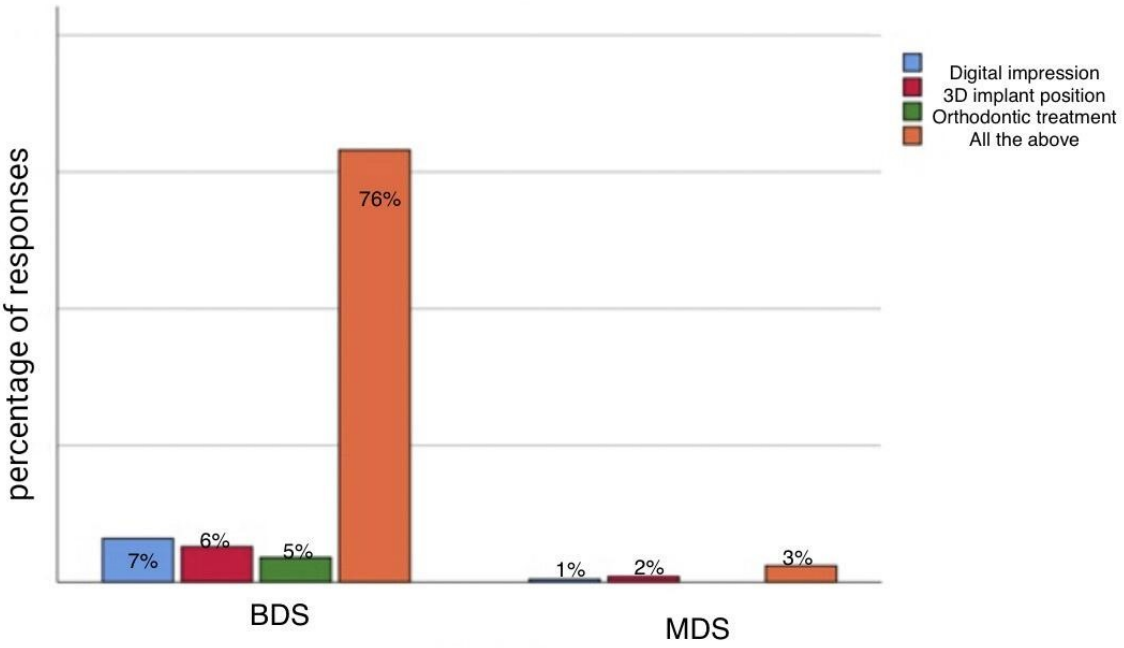

Fig 14: Bar graph showing the association between the qualification and the knowledge about the uses of intraoral scanners. X axis represents the qualification and Y axis represents the uses of intraoral scanners. Majority of the undergraduate students are aware about the uses of intra oral scanners and said that the intraoral scanners can be used for digital/ optical impression, 3D implant position, orthodontic tooth movement (76%) and the difference is also statistically significant. Chi square test done. P value 0.000<0.05, hence statistically significant.

A dental impression is a negative imprint of hard and soft tissues in the mouth from which a positive reproduction can be formed. It is made by placing an appropriate material in a stock or custom dental impression tray. Alginate is an elastic, irreversible hydrocolloid impression material. It is the one of the most frequently used dental materials and is a simple, cost effective, indispensable part of dental practice. There is a chance for contamination of impressions with various microorganisms **[21-23]**. Intraoral scanners are instruments, used for direct optical impression in dentistry. The output bodies capture pictures by imaging sensors. In present study, among the total population 52.2% were female and 46.8% was male **(Fig 1)**. Among the population 58% were undergraduates and 42% were postgraduate dental students **(Fig 2)**. Among the population 95% were aware of intraoral scanners and 4.2% not aware of intraoral scanners **(Fig 3)**. A majority of the population were aware, so this shows that the future of digital dentistry is increased use of advanced aids like intraoral scanners. Among

the population 16.1% thought that the intraoral scanners are utilized for direct optical impression and 4.4% of the population believe that they are the gadgets for capturing 3D implant positions and 79.5% population answered both **(Fig 4)**. Thus intraoral scanners can be used in diagnosis and treatment for various dental problems.

According to the study population, the advantages of intraoral scanners will be less patient inconvenience 9.3% and 4.4% no need to utilize the plaster cast and 82.4% of the population answered both and 3.9.% population were confused and answered wrong **(Fig 5)**. Among the population 96.1% are aware of intraoral scanners help in better communication with patients and 3.9% do not agree with the statement **(Fig 6)**. Among the population 94.1% of students the intraoral scanners thought that intraoral scanners will detect the deep marginal lines, and 5.9% population stated no **(Fig 7)**. Among the population 71.2% students believe that it is hard for more established clinicians with less experience and no interest for mechanical development to adjust the gadget **(Fig 8)**. Majority of the population (90.7%) says that the buying and managing cost for the gadgets will be costly **(Fig 9)**. 80% of the population were aware of the clinical uses of intraoral scanners **(Fig 10)**. Among the population 89.8% think that intraoral scanners are easy to use and are efficient **(Fig 11)**. Among the population 68.8% students have used intraoral scanners before for clinical purposes and 31.2% population didn't use this gadget before for any clinical techniques **(Fig 12)**. Ahmed *et al* explained that the effectiveness of full-arch scanning is dependent on the scanning system used, in their study most of the population had the perception of time saving **[24]**. This was in accordance with the current study. Majority of the postgraduate students used intraoral scanners before for clinical procedures and the maximum number of undergraduate people doesn't use intraoral scanners before for their clinical procedures **(Fig 13)**. Majority of the undergraduate students are aware that the intraoral scanners used for digital/ optical impression, orthodontic tooth movement and 3D implant position **(Fig 14)**. There are a number of similar studies that have explored the perception and efficiency of various intraoral scanners among dental students **[25-27]**. Moreover no studies have been done before, among dental students of Indian population. The limitation of the present study is the less sample size.

4. CONCLUSION

It can be concluded that the intraoral scanners are effective, reduce the patient's discomfort and are time saving devices as compared to the conventional impression methods. Majority of the postgraduate students used the intraoral scanners than the undergraduate students for their clinical procedures. Maximum number of people agree that the intraoral scanners are the time saving instrument. Within the limitations of the study, an adequate level of knowledge and awareness was present among the study population.

5. ACKNOWLEDGEMENT

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6. CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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