

## Assessment of knowledge, attitude and practice on methods of caries excavation among dental undergraduate students - A questionnaire survey

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### ABSTRACT:

**INTRODUCTION:** The techniques used in carious dentine removal were developed by GV Black, in 1893, who initially proposed the principle of ‘extension for prevention’ in the operative treatment of carious lesions. He proposed that the removal of sound tooth structure and anatomical form at sites that might otherwise encourage plaque stagnation (e.g. occlusal fissures, approximal contact points) would help minimise caries onset and progression. The aim of this survey was to assess the knowledge, attitude and practice on the methods of caries excavation among dental undergraduate students.

**MATERIALS AND METHODS:** A questionnaire was designed online using google docs which consisted of 15 questions on the knowledge, attitude and practice of methods of caries excavation. The study population included dental students. Data was collected and tabulated in Excel. Data was analysed by descriptive statistics and chi square test using SPSS software.

**RESULTS:** 80% of the respondents were aware of caries excavation, 79% of the respondents were aware about the newer techniques used for caries excavation. Majority of the female respondents were aware about the caries excavation techniques and its effectiveness ( $p < 0.05$ ).

**CONCLUSION:** According to the data collected it can be concluded that 80% of the respondents were aware of caries excavation, 69% of respondents were aware that fluorescence aided caries excavation was effective. The majority of the female participants were aware about the caries excavation and its effectiveness.

**KEYWORDS:** Caries, excavation, techniques, dental students, awareness.

### INTRODUCTION:

The techniques used in carious dentine removal have developed since GV Black, in 1893, initially proposed the principle of ‘extension for prevention’ in the operative treatment of carious lesions. He proposed that the removal of sound tooth structure and anatomical form at sites that might otherwise encourage plaque stagnation (e.g. occlusal fissures, approximal contact points) would help minimise caries onset and progression(1). In more recent years, with the advent of adhesive restorative materials and the subsequent developments in minimal cavity design, this widely accepted principle has been challenged and is now considered too destructive a method for caries removal(2). Latest theories regarding the rationale of carious dentine removal are also beginning to question the amounts of tissue that need to be excavated in order to successfully treat a carious lesion(3)-(4).

There are various methods found and are in use for caries excavation, in that case there are chemomechanical agents, caries disclosing dyes, air abrasion, lasers and, of course, the conventional mechanical caries removal using hand or rotary instruments. So the most important or significant aspects of caries excavation is removing only the dentin part which is infected and to preserve the healthy tissues, and when excavation procedure is taking place time management is important and many new procedures have been introduced(5–7). One such procedure is fluorescence aided caries excavation which is more effective than the conventional methods in the removal of infected dentin. The procedure saves time by projecting the areas with caries. The fluorescence-aided identification technique (FIT) is a diagnostic tool to improve differentiation between composite resin restorative materials and sound tooth structure (8). Fluorescence occurs when light is absorbed and emitted at almost the same time; however, the emitted light has a longer wavelength, making the illuminated object appear brighter (9).

Some more excavation techniques are using cutting instruments which are comfortable and easy to use in the clinical environment. They have the ability to differentiate and remove diseased tissue only, it is painless and requires minimal pressure, less heat is generated and is also affordable(10). There are excavators, handpiece and burs which are in

universal use but still have disadvantages like high pitched noise, pressure on the tooth, etc.,(11)-(12) Air abrasion alternative pseudo-mechanical method for dental tissue removal which involved bombarding the tooth surface with high-velocity particles (conventionally aluminium oxide (Al<sub>2</sub>O<sub>3</sub>) carried in a stream of air(13).

There are additional techniques like air polishing, ultrasonic instrumentation, sono abrasion, chemo-mechanical methods like caridex and carisolv, and even lasers are used which are new to the field (14–17). Our team has extensive knowledge and research experience that has translate into high quality publications(18–27),(28–31),(32–36)(37). So, the aim of this survey is to assess the knowledge, attitude and practice on the methods of caries excavation among dental undergraduate students.

#### **MATERIALS AND METHODS:**

A cross sectional study was conducted among undergraduate dental students in a dental institution. This was done in the form of a questionnaire that was circulated online. The dental students were of the age group 18 to 25 years. The study protocol was approved by the institutional review board and the questionnaire was validated. The sample size of this study was 100. The questionnaire consisted of 15 questions that mainly focused on knowledge, attitude and practice on methods of caries excavation among dental undergraduate students. The questionnaire was distributed among the students through an online survey website called google forms. The data was collected, compiled and was arranged in a systematic manner and was analysed according to SPSS software. The Pearson Chi Square test was also done. The confidence interval was found to be 95% and statistical significance of  $p < 0.05$ . The independent variable of the study was gender. The results were then represented in the form of pie charts and bar charts.

#### **Inclusion criteria:**

The participants should be dental students.

#### **Exclusion criteria:**

Students who were not available to take the survey.

Students who were not willing to participate.

Dentists who had completed the period of study.

#### **Study Setting:**

The study was conducted with the approval of the Institutional Ethics Committee. The study consisted of one assessor and one guide .

#### **Study method:**

Self administered questionnaire of 15 close-ended questions was prepared and was validated by the Institutional Review Board(IRB). The questionnaire was distributed among undergraduate dental college students of private dental college institutions through an online survey form "GOOGLE FORMS" . Demographic details were also included in the questionnaire.

#### **Sampling Technique:**

The study was based on a non probability consecutive sampling method.

#### **Ethical considerations:**

Returning the filled questionnaire was considered as implicit consent with no need for signing for a return consent. Ethical approval of study is obtained from the Institutional Review Board (IRB).

#### **Statistical analysis:**

Data was analysed with the SPSS version (22.0). Descriptive statistics as number and percent were calculated to summarize qualitative data. Chi square test was used to analyze and compare the education level of students and their knowledge, attitude and practise on armamentarium for endodontic surgery among undergraduate dental students. The confidence level was 95% and the statistical significance  $p < 0.05$  was considered statistically significant. Finally the results were represented by using bar charts and frequency tables.

#### **RESULTS:**

The results of the study are presented as pie charts and bar diagrams below. The majority of the students were aware about the methods of caries excavation.

#### **DISCUSSION:**

This study was conducted to assess the knowledge, attitude and practice on the caries excavation among dental students of a dental college in Chennai. The study was conducted among 100 students which included both male and female.

Of the participants 59% of the participants were female and 41% of the participants were male. 80% of the respondents are aware of caries excavation and 20% of the respondents are not much aware about it (Graph 1). Graph 2 represents the awareness about newer techniques used for caries excavation and 79% of respondents were aware all the mentioned options are techniques used for excavation, and 15% of respondents answered on enzymatic caries dissolving agents and 6% answered only Sono/air abrasion techniques. Graph 3 represents the awareness about excavation techniques which is more effective and 69% of respondents answered that Fluorescence aided caries excavation was effective and 31% respondents answered conventional techniques were effective. Graph 4 represents the knowledge on which technique takes less time to be done and 85% of the respondents answered Fluorescence aided caries excavation as less time consuming technique and 15% of respondents answered conventional excavation as the technique which takes less time to be done. Graph 5 represents the knowledge about which technique is less invasive and 69% of the respondents

answered lasers to be less invasive and 31% of respondents answered tungsten carbide to be less invasive. Graph 6 represents the knowledge about the techniques which can be used for children and 70% of the respondents answered that airtor can be used and 30% of the respondents answered that the Carisolv method can be used. Graph 7 represents the knowledge about the main excavation techniques used and 84% answered that all the given options are correct, 10% answered that only conventional methods are used and 6% answered that chemomechanical methods are used and are the main technique for excavation. Graph 8 represents the knowledge about the techniques used in minimally invasive procedures, 85% of the respondents answered that laser ablation is minimally invasive and 15% of respondents answered that air ablation is minimally invasive. Graph 9 represents the knowledge about the minimally invasive method that takes less time to be completed, 79% of the respondents answered ultrasonic and 21% of the respondents answered conventional techniques to take less time in completion. Graph 10 represents the knowledge about the technique which causes bleeding during the procedure, 79% of the respondents answered high speed air driven as the techniques that causes bleeding and 21% of respondents answered ultrasonic as the techniques that causes bleeding during procedures. The female participants were more aware about the caries excavation whereas the male participants were less aware about various caries excavation methods and on their effectiveness in caries excavation (Figure 11 and Figure 12). The difference was statistically significant (Chi-Square test; p-value= 0.000 - significant)

### CONCLUSION:

According to the data collected it can be concluded that 80% of the respondents were aware of caries excavation, 69% of respondents were aware that fluorescence aided caries excavation was effective. The majority of the female participants were aware about the caries excavation and its effectiveness in caries removal.

### ACKNOWLEDGEMENT

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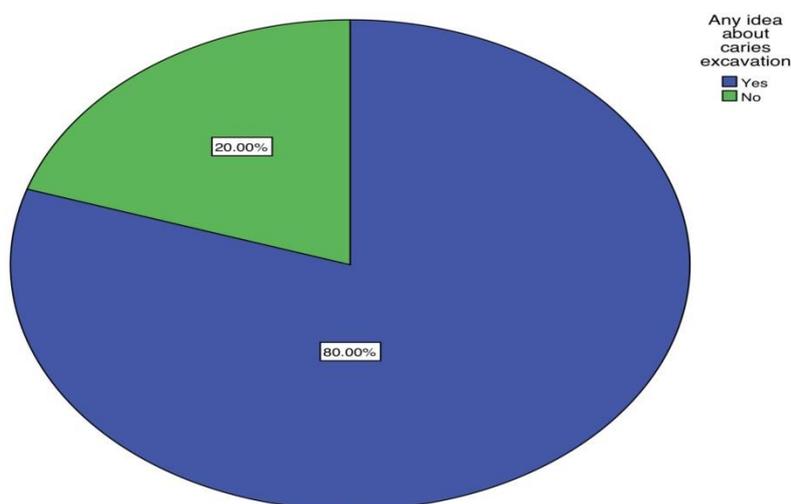
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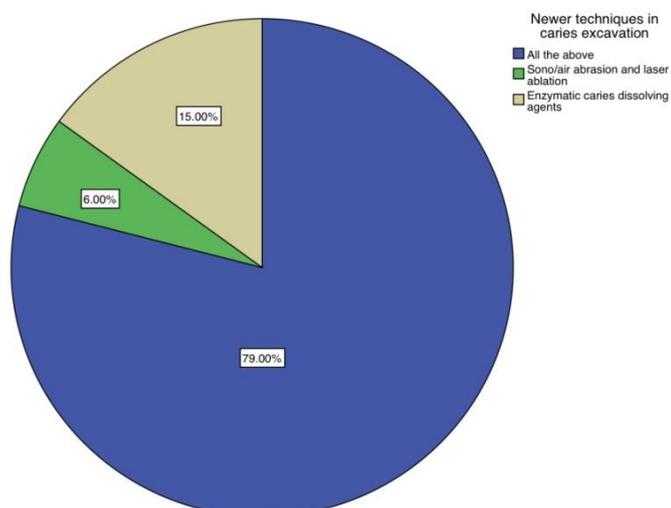
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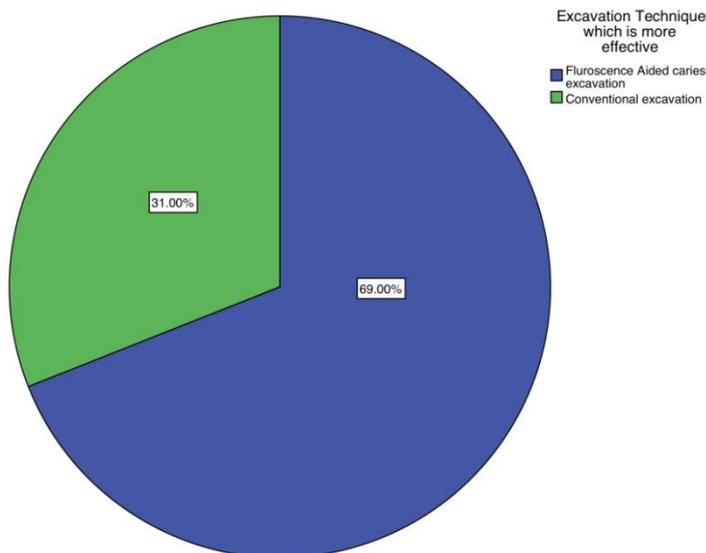
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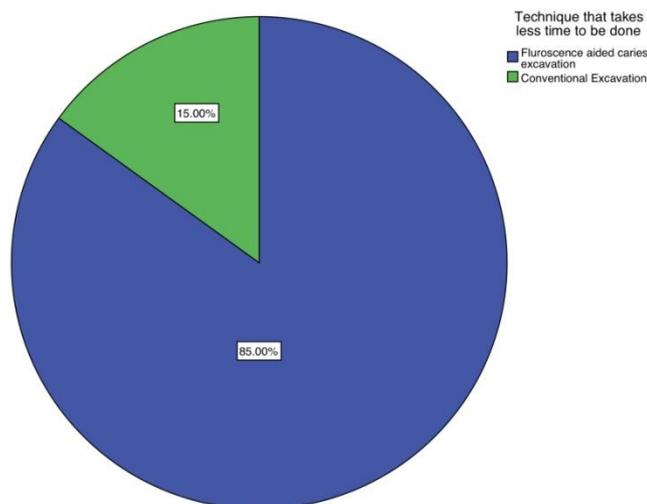
Graph 1 represents that 80% of the respondents are aware of caries excavation and 20% of the respondents are not much aware about it. Blue represents that the respondents are aware and green represents that the respondents are not aware.



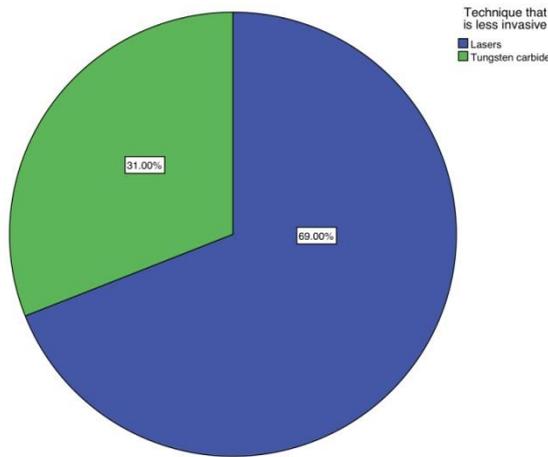
Graph 2 represents the awareness about newer techniques used for caries excavation and 79% of respondents were aware all the mentioned options are techniques used for excavation. 15% of respondents considered enzymatic caries dissolving agents and 6% considered only Sono/air abrasion techniques as newer techniques.



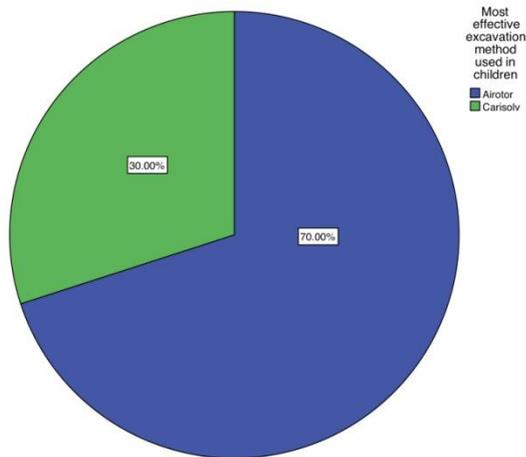
Graph 3 represents the awareness on the relatively effective technique for caries excavation. 69% of respondents answered that Fluorescence aided caries excavation was effective and 31% respondents answered conventional techniques were effective.



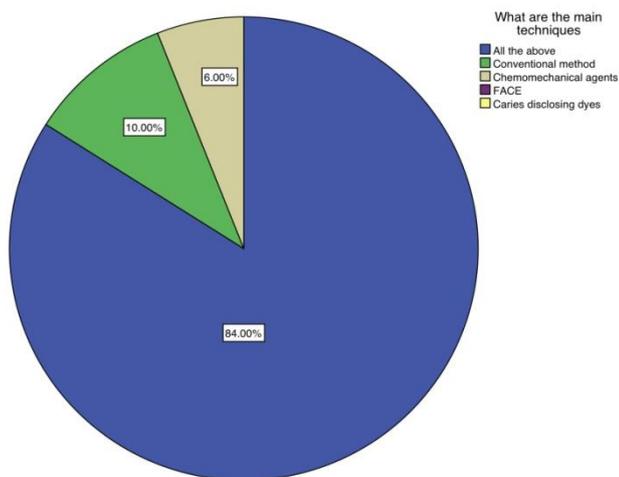
Graph 4 represents the opinion on which technique takes less time to be done. 85% of the respondents answered Fluorescence aided caries excavation as less time consuming technique and 15% of respondents answered conventional excavation as the technique which takes less time to be done



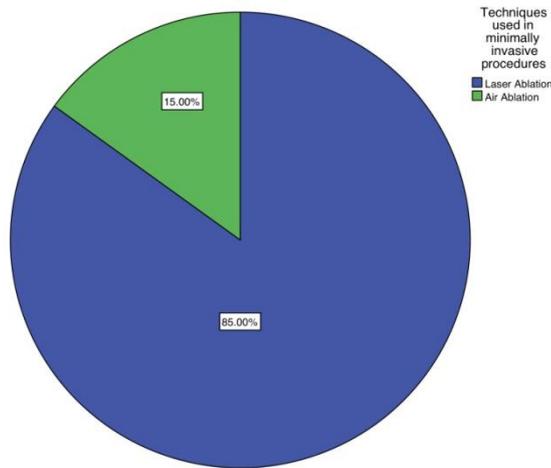
Graph 5 represents the opinion about which technique is less invasive. 69% of the respondents believed lasers to be less invasive and 31% of respondents believed tungsten carbide to be less invasive.



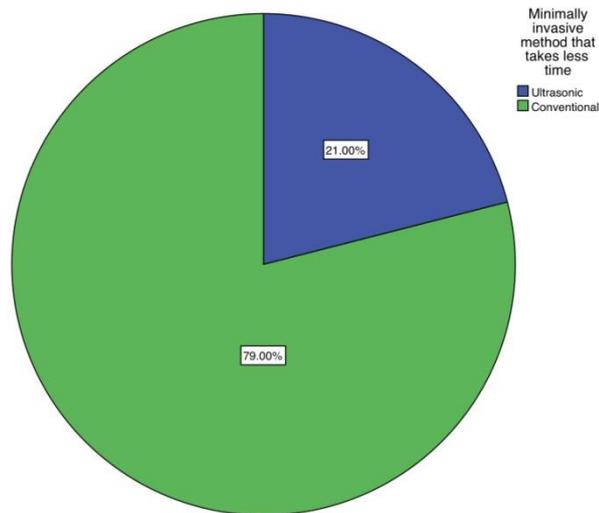
Graph 6 represents the opinion on the technique that can be used for children. 70% of the respondents answered that Airotor can be used and 30% of the respondents answered that the Carisolv method can be used.



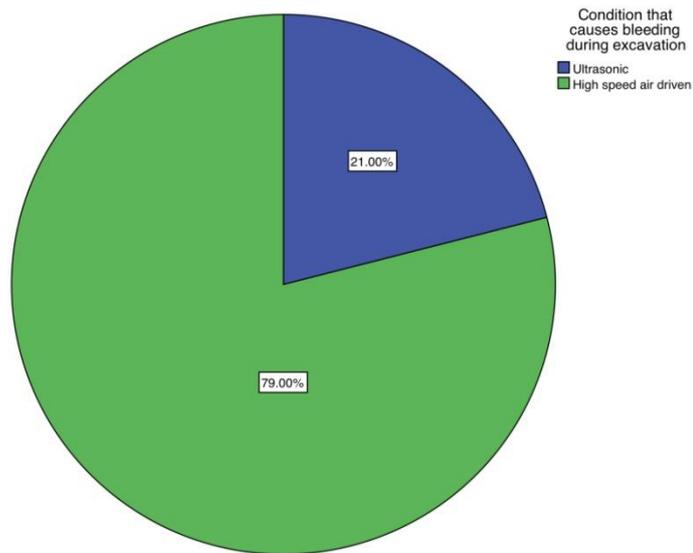
Graph 7 represents the knowledge about the main excavation techniques used and 84% answered that all the given options are correct, 10% answered that only conventional methods are used and 6% answered that chemomechanical methods are used and are the main technique for excavation.



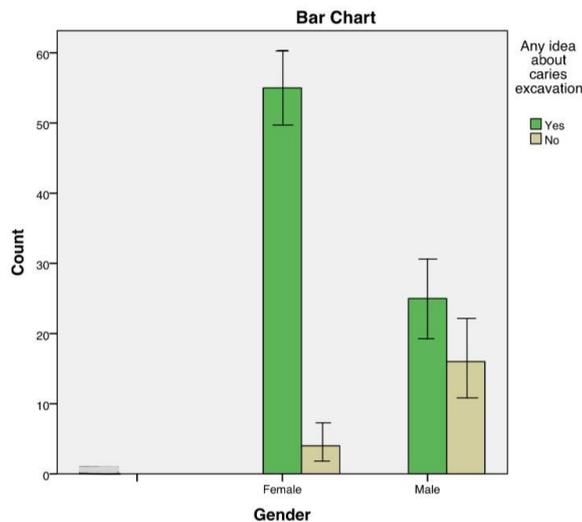
Graph 8 represents the knowledge about the techniques used in minimally invasive procedures, 85% of the respondents answered that laser ablation is minimally invasive and 15% of respondents answered that air ablation is minimally invasive.



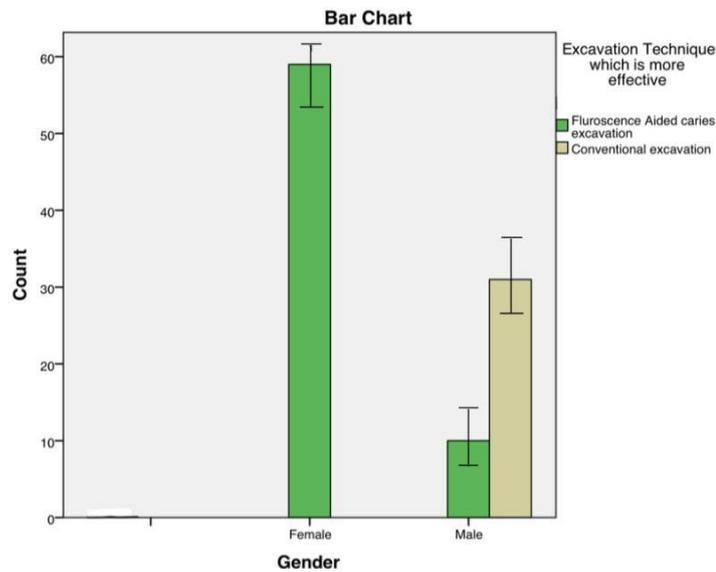
Graph 9 represents the knowledge about the minimally invasive method that takes less time to be completed, 79% of the respondents answered ultrasonic and 21% of the respondents answered conventional techniques to take less time in completion.



Graph 10 represents the knowledge about the technique which causes bleeding during the procedure, 79% of the respondents answered high speed air driven as the technique that causes bleeding and 21% of respondents answered ultrasonic as the technique that causes bleeding during procedures.



Graph 11: Bar graph depicts the association between Gender and knowledge about caries excavation. X axis represents the gender and Y axis represents the number of participants. Greencolour represents yes and cream colour represents no. The female participants were more aware about the caries excavation whereas the male participants were less aware about the caries excavation. The difference was statistically significant (Chi-Square test; p-value= 0.000 - significant)



Graph 12 Bar graph depicts the association between Gender and knowledge about which excavation technique is more effective. X axis represents the gender and Y axis represents the number of participants. Green colour represents Fluorescence aided caries excavation and cream colour represents Conventional excavation. The female participants were more aware about which technique was most effective whereas the male participants were less aware about the most effective technique. The difference was statistically significant (Chi-Square test; p-value= 0.000 - significant)