

Knowledge On Tooth Bleaching Among Undergraduates - A Cross Sectional Survey

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Abstract

Introduction: Tooth bleaching has now become a very popular part of aesthetic dentistry and one of the most conservative treatments for discoloured teeth. The bleaching effect is due to hydrogen peroxide and urea peroxide. The main aim of this study is to provide better knowledge. It is widely used by clinicians and home bleaching has a high success rate as well.

Aim: The aim of the study is to analyse knowledge about tooth bleaching among UG students.

Materials and method: A survey was conducted through an online platform among UG students. The responses received were formulated and coded in excel sheets and then were transferred to SPSS version 23 for final results.

Results: There were 103 responses collected from dental ug students for this survey. From the responses collected, it is shown that the 3rd year students about 36% were more knowledgeable about teeth bleaching than 1st year (26.47%), 2nd year (20.59%), and 4th year (16.67%). The association between years of study and the knowledge about the bleaching action yields a p value: 0.010 which is statistically insignificant.

Conclusion: knowledge about teeth bleaching is highest among third years as compared all other years of study among undergraduates. Students are aware but need more wider knowledge on this topic which will enhance and widen their boundaries regarding this topic.

Keywords: Bleaching, discoloration, Non vital, Peroxides, sensitivity, innovative technology, novel method

Introduction

Aesthetics of teeth are of great importance. Teeth colour impacts and affects many people. Teeth colour is influenced by a combination of intrinsic and extrinsic stains on teeth (1). Use of peroxides for bleaching has been applied for more than a century (2). Aesthetics and its demand has raised the frequency of tooth bleaching in patients (3).

Vital tooth bleaching involves various materials and methods. In dental offices vital tooth Bleaching has become an accepted daily treatment (4). Variety of bleaching techniques are also used which attracts many as these are not complex and are non invasive. Techniques involved basically bleaches the chromogen present in the Dentine inside the enamel (5). Darkening of non-vital teeth is due to the phenomena from pulpal necrosis internal (6) and extracoronal bleaching is a conservative way of treatment of stained non-vital teeth (3).

Also the technique of bleaching can be enhanced using plasma with hydrogen peroxide that is H₂O₂ (7). Biomedical applications of plasma can be used in Bleaching recently. Thus students should have more knowledge about tooth bleaching as most of the patients are concerned about esthetics. Our team has extensive knowledge and research experience that has translated into high quality publications (8-27). The aim of the study is to analyse knowledge about bleaching among UG students.

Materials and method

Study design

A cross sectional study was conducted through an online survey from February to April 2021 among undergraduates.

Study subjects

A simple random sampling was used to select the study participants. All the dental students who were willing to participate were included.

Ethical considerations

Returning the filled questionnaire was considered as implicit consent as a part of the survey. Ethical approval for the study was obtained from the Institutional Review Board (IRB), Saveetha Dental College.

Study methods

Self administered questionnaire of close-ended questions was prepared and it was distributed among dental students from February to April 2021 through the online survey “google forms”. The collected data was checked regularly for clarity, competence, consistency, accuracy and validity. Demographic details were also included in the questionnaire. Chi square test was used to analyze and comparative bar graphs were plotted and it is statistically significant only if the p value is less than 0.05

Statistical analysis:

Data was analysed with the SPSS version (23.0). Descriptive statistics as percent were calculated to summarise qualitative data. Chi square test was used to analyze.

S. N	Questions	Option 1	Option 2	Option 3	Option 4
1	Discolouration of tooth in tetracycline therapy is due to the formation of:	Calcium orthophosphate	Calcium oxide	Tetracalcium phosphate	Calcium phosphate
2	What are all the light source used for bleach office	Conventional bleaching light	Xenon plasma arc light	Diode laser	All of the above
3	Which of the following is not the indication of bleaching?	Dentin discolouration	Dentine hypersensitivity	Mild fluorosis	Superficial staining

4	Which one of the following is used to bleach a discoloured endodontically treated tooth?	Superoxol	Ether	Chloroform	Ethanol
5	Which is not the effect of bleaching tooth and its supporting structures	Tooth hypersensitivity	Cervical resorption	Burns on gingiva	Periodontal abscess
6	What is formed by hydrogen peroxide that is responsible for bleaching action	Free radical perhydroxyl	Cation	Anion	Oxide
7	The most common consequence of bleaching non vital teeth is	Cervical resorption	Root resorption	Pulpal resorption	Enamel resorption
8	Lasers used in bleaching technique	Argon laser	CO2 laser	Gallium aluminium arsenic diode	All of the above
9	Superoxol contains	30% H2O2	Combination of H2O	Hydrochloric acid	Nitric acid 20%
10	Which contraindication is not true among the night guard bleaching	Hydrogen peroxide	Advised in case of mild staining	In severe fluorosis	Less chair time

Statistical analysis

Responses received were analysed and produced Microsoft excel sheet and then transferred into SPSS version 23 for further analysis and final results like pie charts and bar graph were formulated.

Results

In our present study, a total of 103 responses were received and evaluated accordingly. Majority of responses were from the third year which was 36.27% and consecutively 1st year with 26.47% then 2nd year students with 20.59% of responses and 4th year with 16.67% of responses (**figure 1**). In our study, the association between years of study and discoloration of teeth in tetracycline therapy was depicted as a bar graph with pearson chi square test and P value is 0.395 which is statistically non-significant(**figure 2**). In our study, the association between years of study and light sources used for bleaching was depicted as a bar graph with pearson chi square test and p value: 0.259 (>0.05) hence it is statistically not significant (**figure 3,4**) In our study, the association between years of study and knowledge about different bleaching agents was depicted as a bar graph with pearson chi square test and p value is 0.146 which is statistically not significant.(**figure 5**).In our study, the association between years of study and indications of bleaching was depicted as a bar graph with pearson chi square test and p value is 0.627 which is statistically not significant. (**figure 6, 7**). In our study, the association between years of study and effect of bleaching was depicted as a bar graph with pearson chi square test and p value is 0.601 which is statistically not significant (**figure 8**).In our study, the association between years of study and mechanism of bleaching was depicted as a bar graph with pearson chi square test and p value is 0.10 which is statistically not significant(**figure 9,10**).In our study, the association between years of study and knowledge about non vital bleaching was depicted as a bar graph with pearson chi square test and p value is 0.347 which is statistically not significant(**figure 11**) In our study, the association between years of study and knowledge about lasers used in bleaching was depicted as a bar graph with pearson chi square test and p value is 0.327 which is statistically not significant(**figure 12**). In our study, the association between years of study and knowledge about contents of superoxol was depicted as a bar graph with pearson chi square test and p value is 0.587 which is statistically not significant (**figure 13**) In our study, the association between years of study and knowledge about night guard bleaching was depicted as a bar graph with pearson chi square test and p value is 0.131 which is statistically not significant.(**figure 14**)

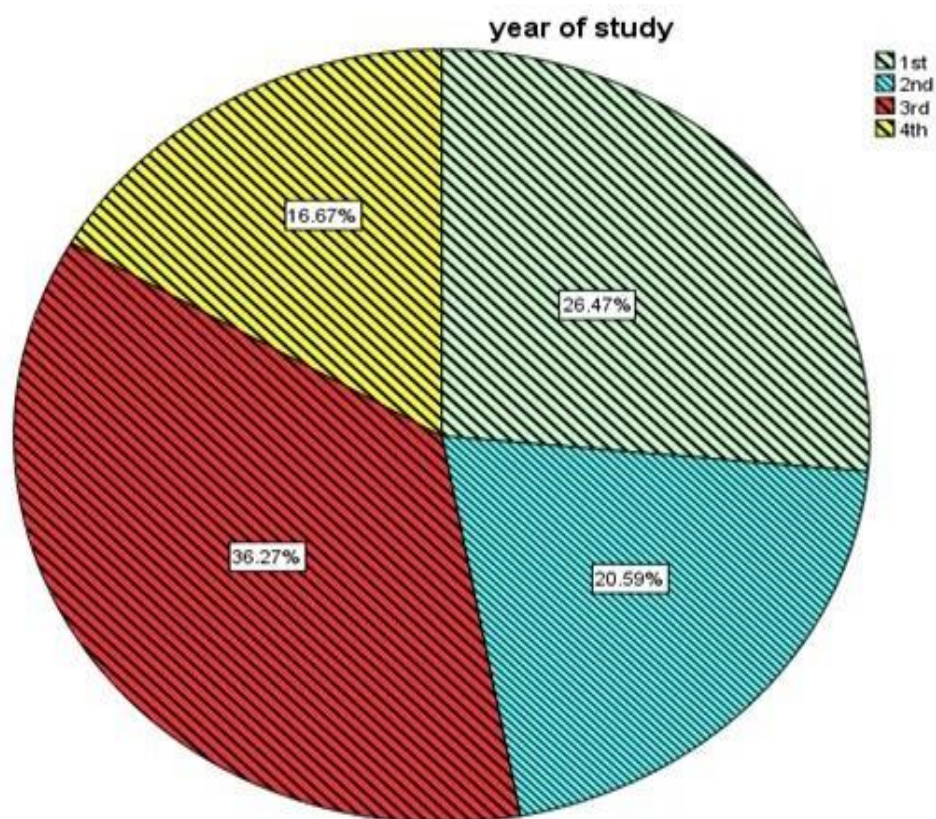


Figure 1: Pie chart shows 103 responses and the distribution of years of study from 1st to 4th year of undergraduate dental students among whom the study was conducted and evaluated accordingly.

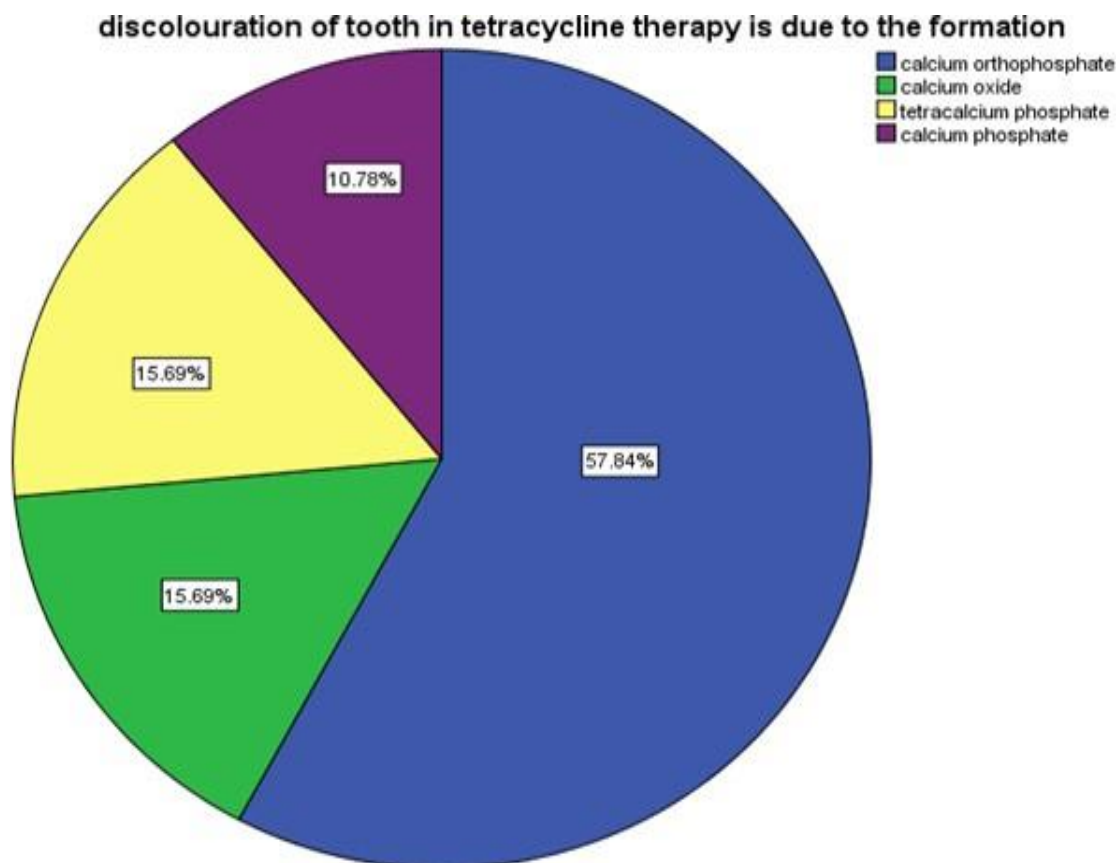


Figure 2: Shows the percentage of responses of the students for discolouration of teeth in tetracycline therapy. Dark blue represents calcium orthophosphate, green for calcium oxide, yellow for tetracalcium phosphate, purple for calcium phosphate. Majority of students (57.84%) were aware that calcium orthophosphate is the reason for tetracycline tooth staining whereas 15.69% (calcium oxide) and 15.69% (tetracalcium) and 10.78% (calcium phosphate) were unaware.

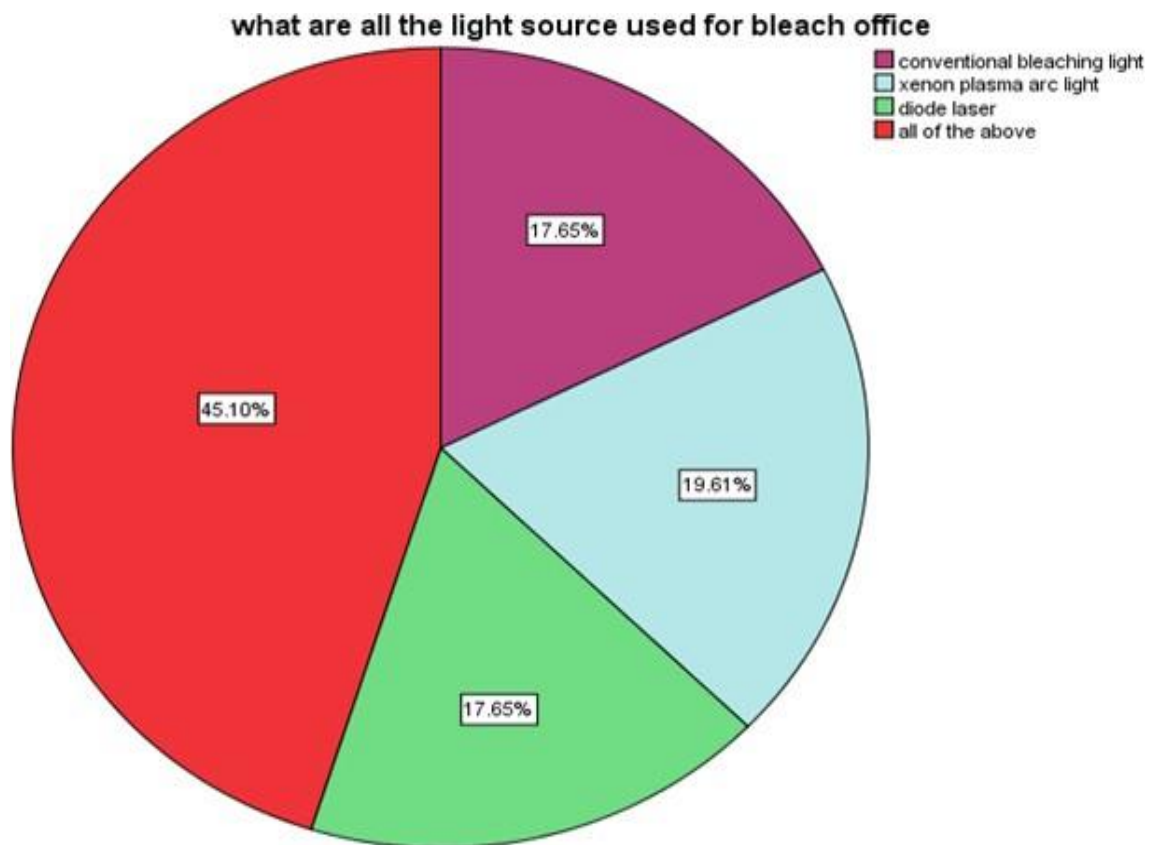


Figure 3: Shows percentage of responses of the students who had the knowledge about light sources used in bleaching. Purple represents conventional bleaching light, light blue is for xenon plasma, green represents diode laser and red for all of the above.

Students around (45.10%) were aware that all of the above is used as light sources. were aware about the light sources while remaining students around 19.61% (chloroform) and 16.67% (xenon plasma arc) and 16.67% (diode laser) were unaware about the light sources used.

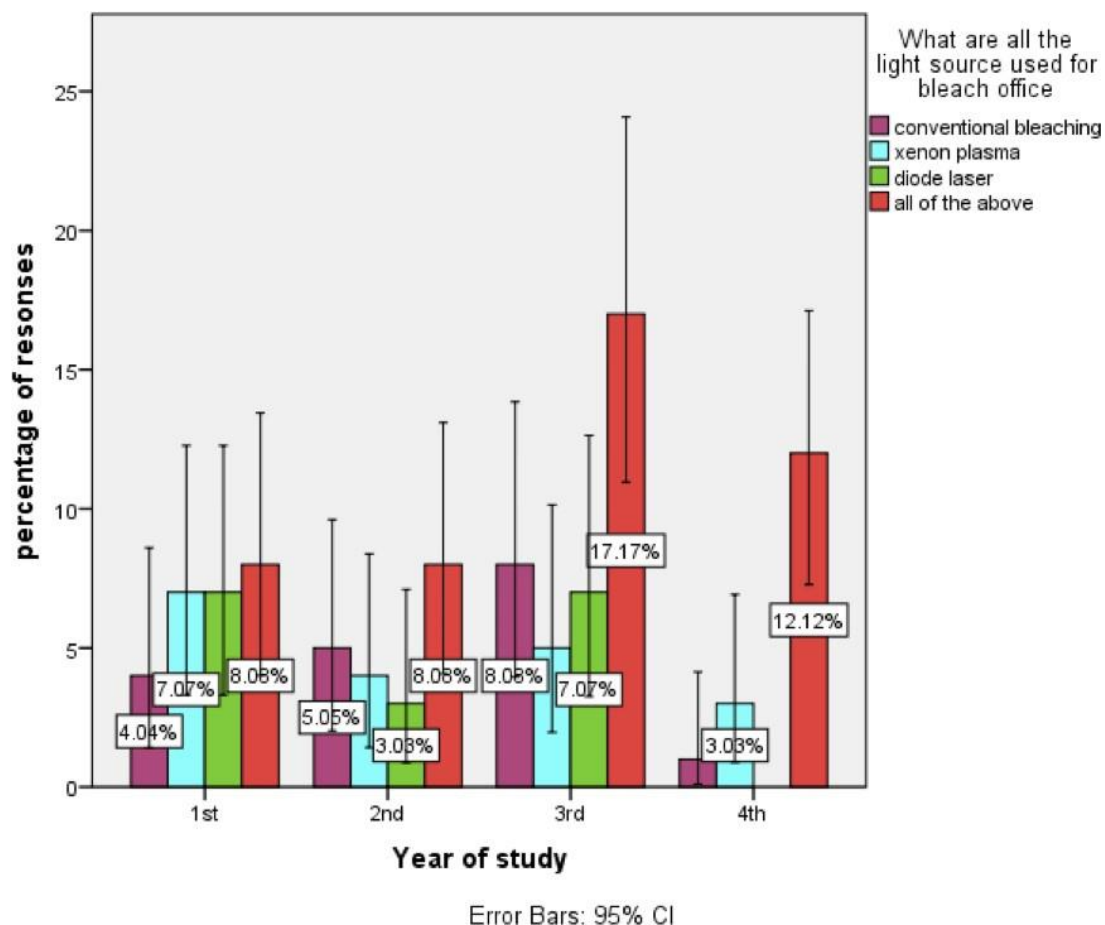


Figure 4: The bar graph depicts the association between the year of study of dental students and questions regarding light source in bleaching. X axis represents the year of study and Y axis represents the percentage of responses. Purple represents conventional bleaching light, light blue is for xenon plasma, green represents diode laser and red for all of the above. Only 45.10% were aware about the light sources (all the above) whereas 17.65% (conventional bleaching light). Majority of third year students have better knowledge about the light sources. Distribution of responses along with years of study of dental students. Pearson Chi Square test was done (chi square test value: 0.332, p value: 0.259 (>0.05)) hence it is statistically not significant results.

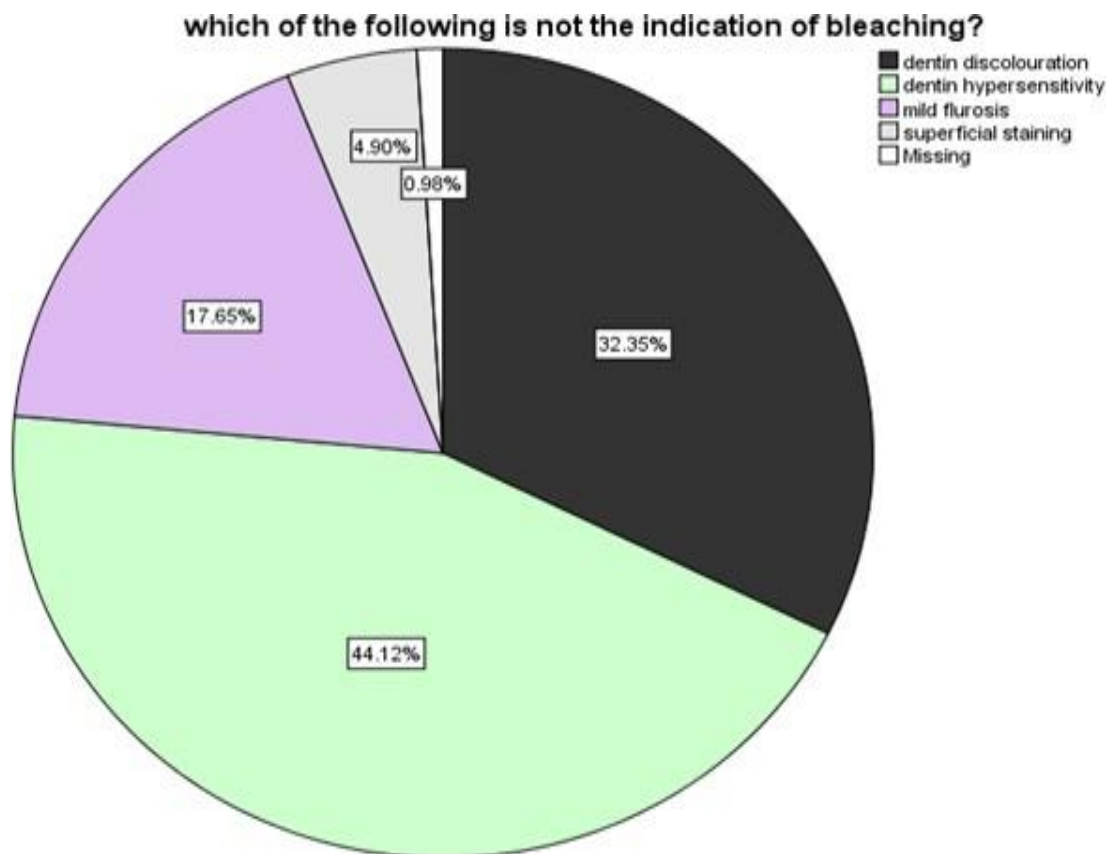


Figure 5: Shows percentage of responses of the participants for indications of bleaching. Black represents dentin discoloration, fluorescent green for dentin hypersensitivity, fluorescent purple for mild fluorosis and grey for superficial staining. The students (44.12%) were aware about the indications of bleaching while 32.35% (dentin hypersensitivity), 17.65% (mild fluorosis), 4.90% (superficial staining) were unaware of the indications of bleaching.

which one of the following is used to bleach a discoloured endodontically treated tooth?

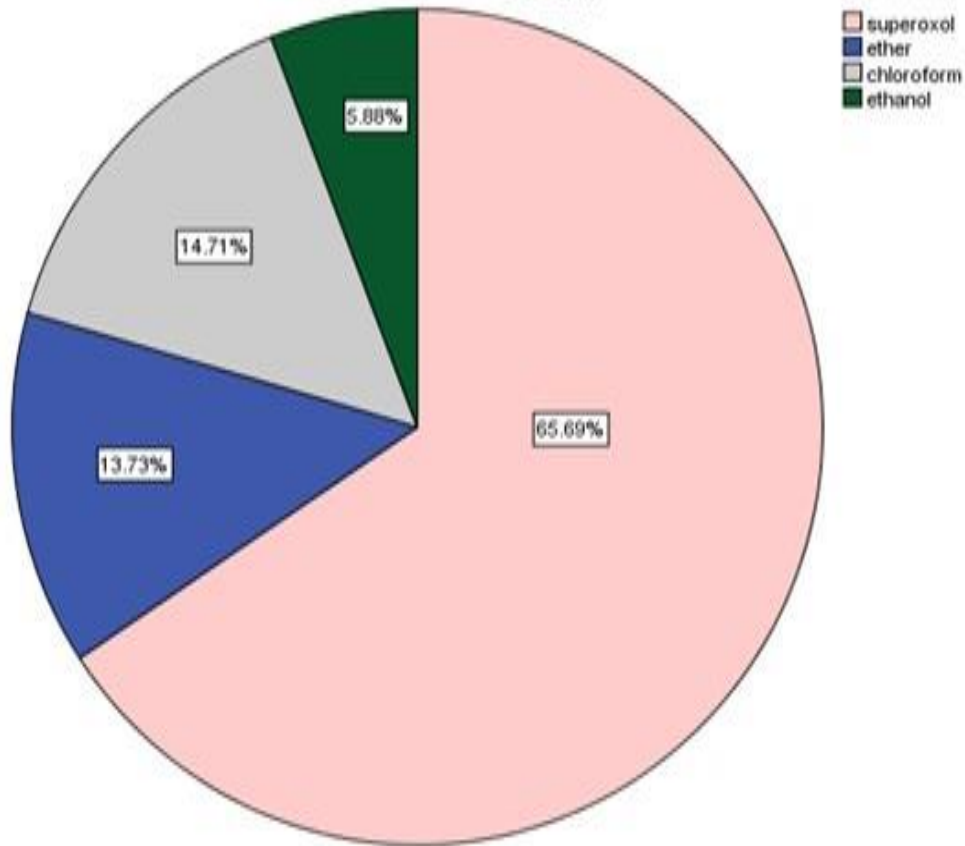


Figure 6: Shows percentage of responses of the students who had knowledge about bleaching agents for different discolourations. Light pink represents superoxol, Navy blue for ether , light grey for chloroform and dark green for ethanol. The majority of responses (65.69%) were aware of superoxol, while 14.71% (chloroform), 13.73 (ether), 5.88% (ethanol) were unaware about bleaching agents.

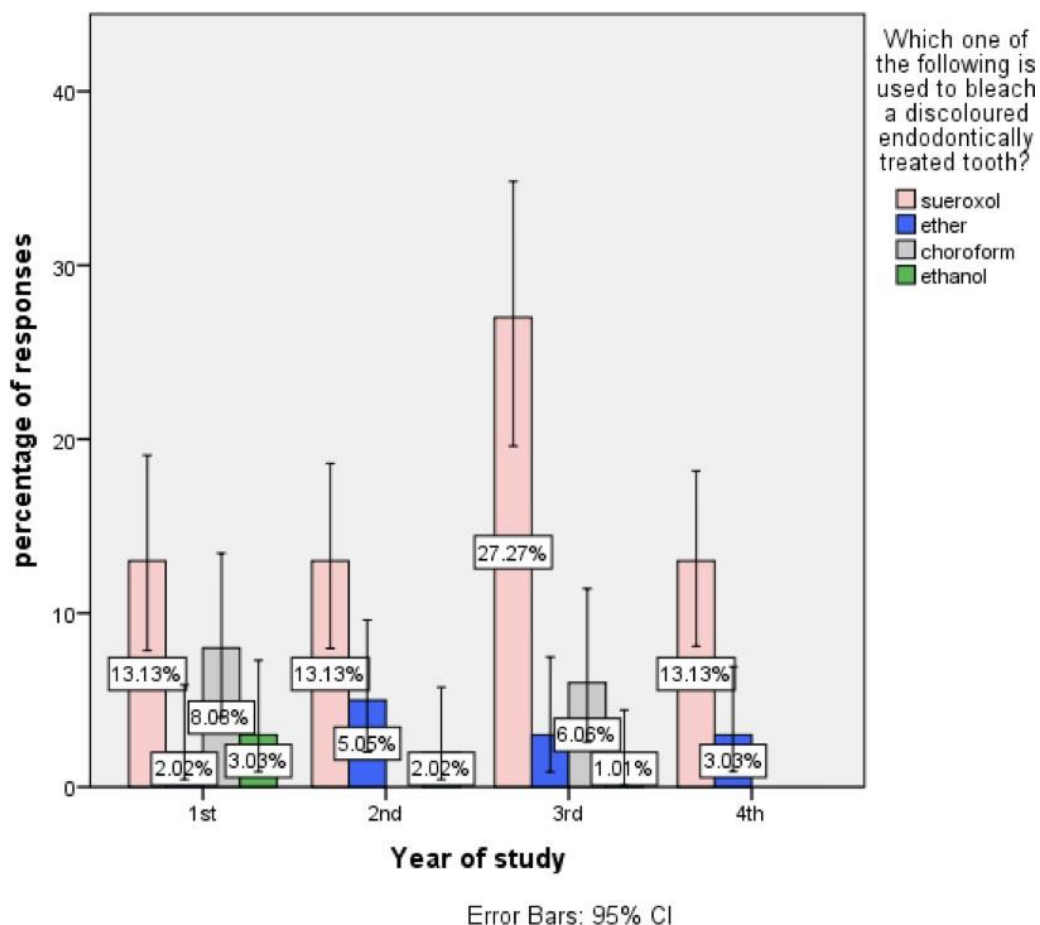


Figure 7: The Bar graph depicts the association between the year of study of dental students and agents used for bleaching. X axis represents year of study and y axis represents the percentage of responses received. Light pink represents superoxol, Navy blue for ether , light grey for chloroform and dark green for ethanol. Majority of third year students with a percentage of 27.27% have better knowledge about agents used for bleaching. Distribution of responses along with years of study of dental students. Pearson Chi- square test was done, (chi square test value:0.422, p value: 0.34(>0.05) hence statistically not significant results.

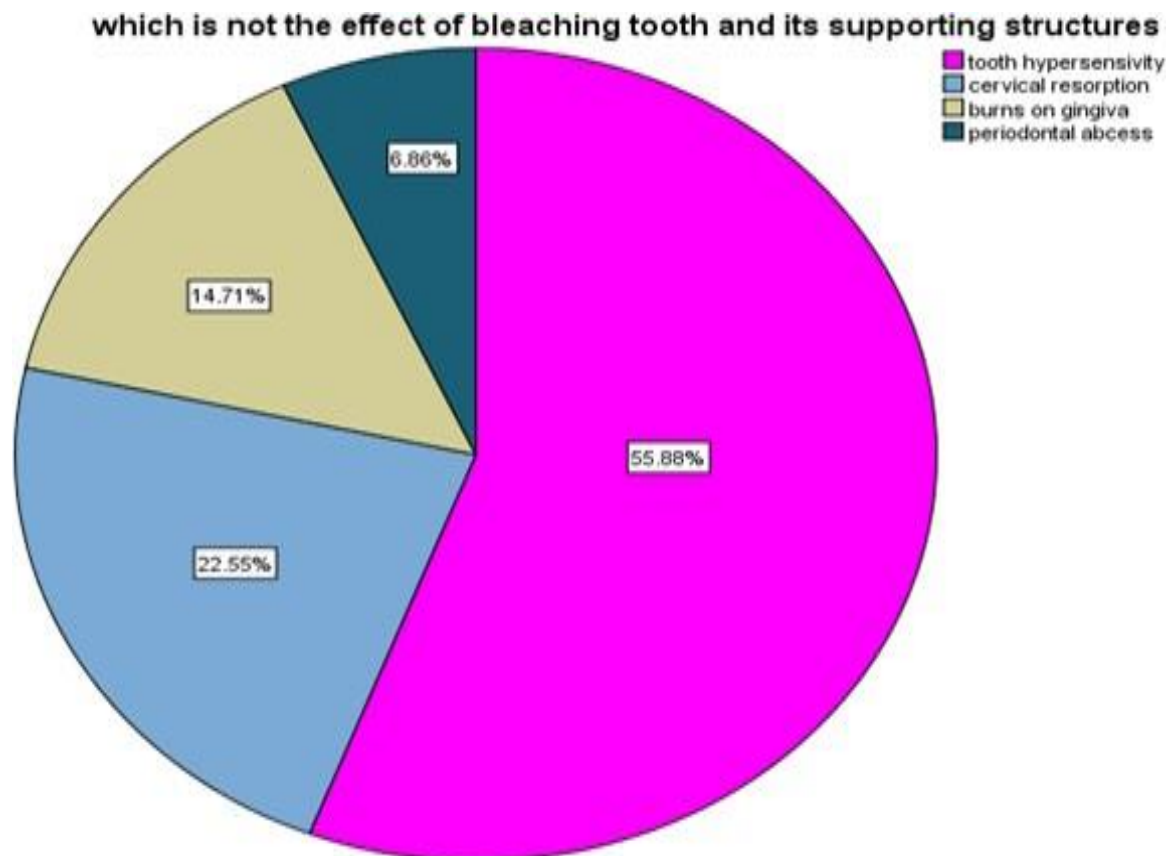


Figure 8: Shows the percentage of responses from the students for the effect of bleaching, Pink represents tooth hypersensitivity, light blue for cervical resorption, yellow for burns on gingiva, light blue for periodontal abscess. Majority (55.88%) were aware of tooth hypersensitivity and 22.55% (cervical resorption) were unaware of the effect of bleaching.

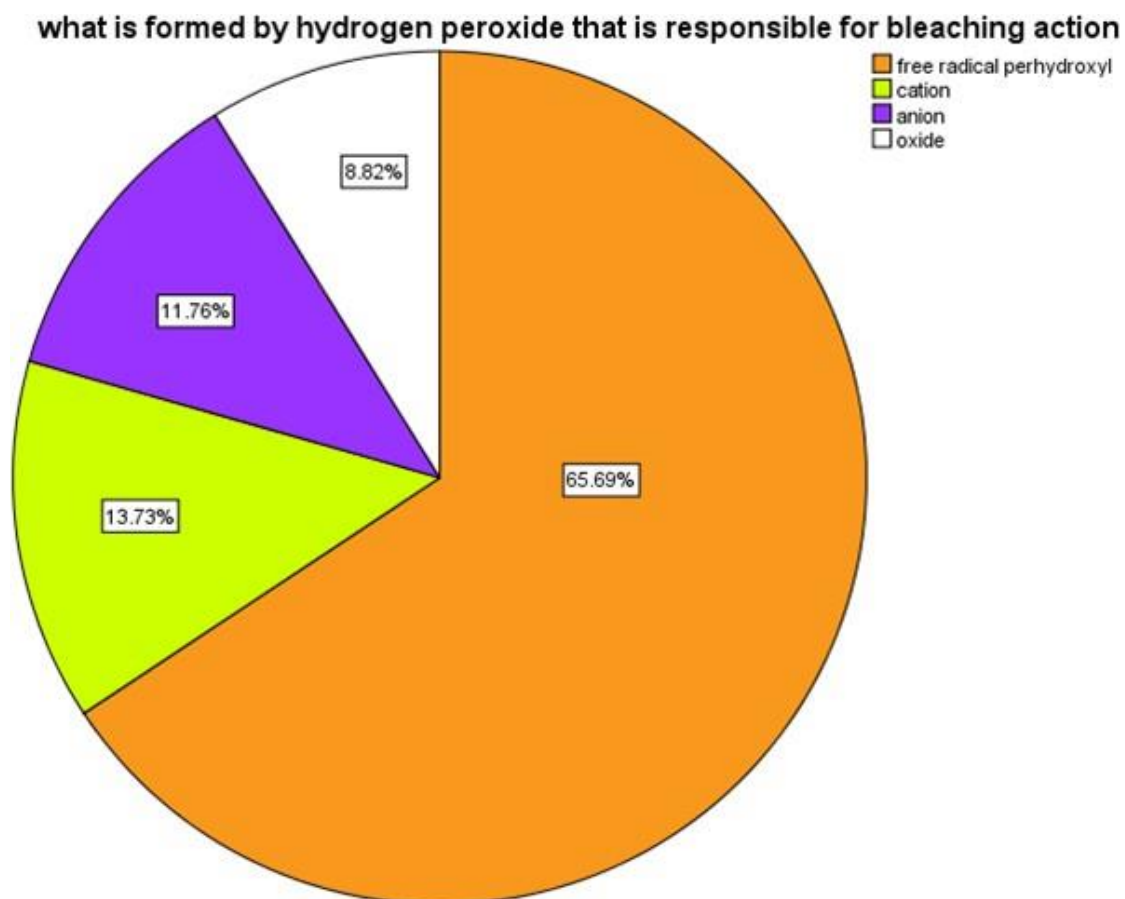


Figure 9: Shows awareness about mechanism behind bleaching technique, the majority of students (65.69%) were aware about free radical remaining students around 13.73% (cation), 11.76% (anion), 8.82% (oxide) and were unaware about mechanism in bleaching. Orange represents free radical, fluorescent green for anion , fluorescent purple for cation , white for oxide.

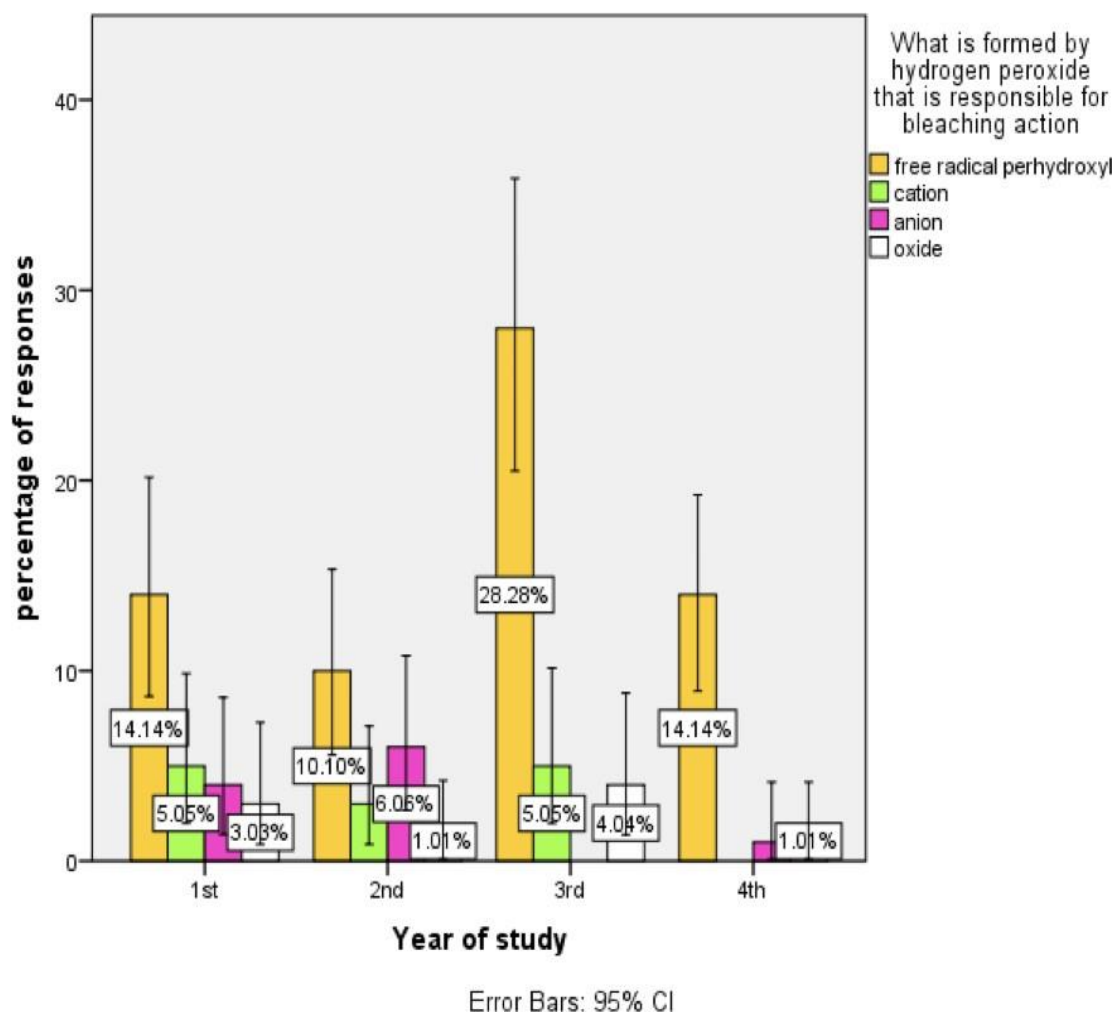


Figure 10: depicts the bar chart showing association between the year of study of dental students and responsible for bleaching action. X axis represents year of study and y axis represents the percentage of responses. Majority of third year students had better knowledge as compared to other years of study with a percentage of 28.28% (free radical perhydroxyl). Distribution of responses along with year of study of dental students. Pearson chi-square test was used. (chi square test value: 0.461, p value: 0.010 (>0.05)) Hence statistically not significant results.

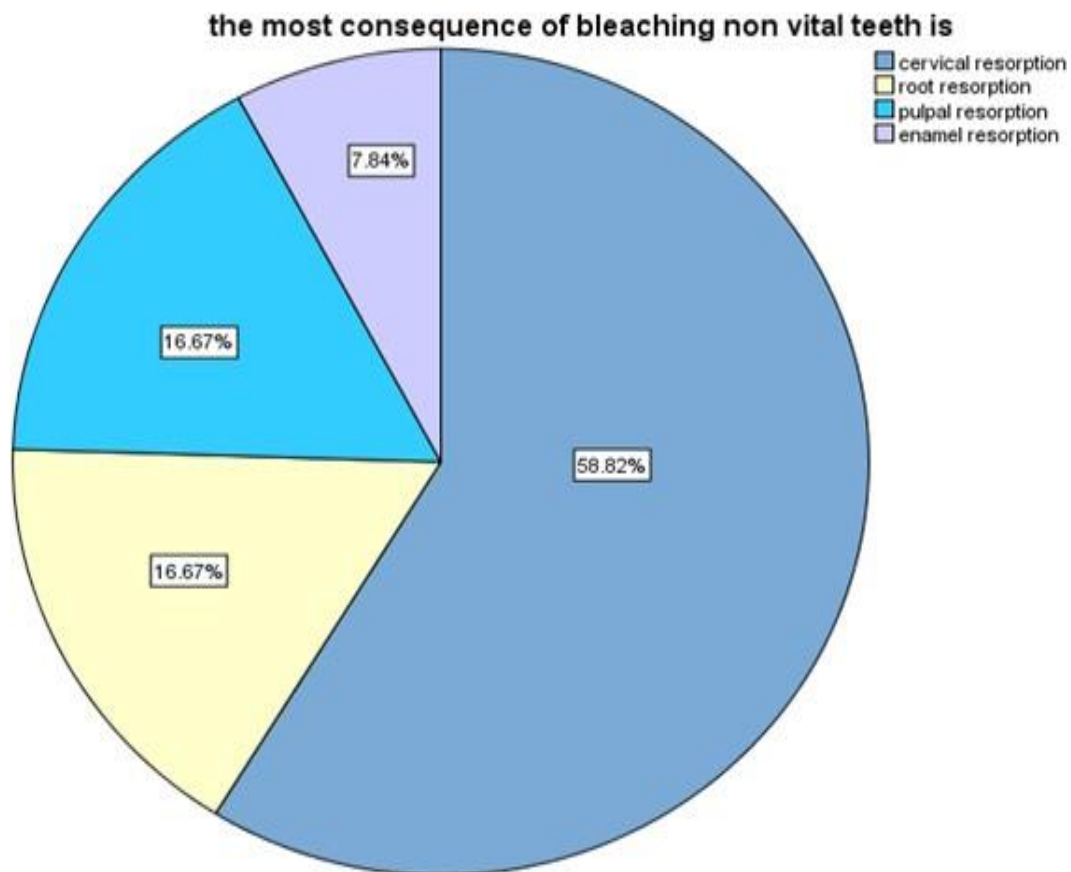


Figure 11: Shows percentage of responses from the students for about non vital bleaching, the majority of responses were (58.82%) that is cervical resorption, 16.67% (pulpal resorption), 16.67% (pulpal resorption) and 7.84% (enamel resorption). Blue represents cervical resorption, yellow for pulpal resorption , sky blue for root resorption , lavender for enamel resorption.

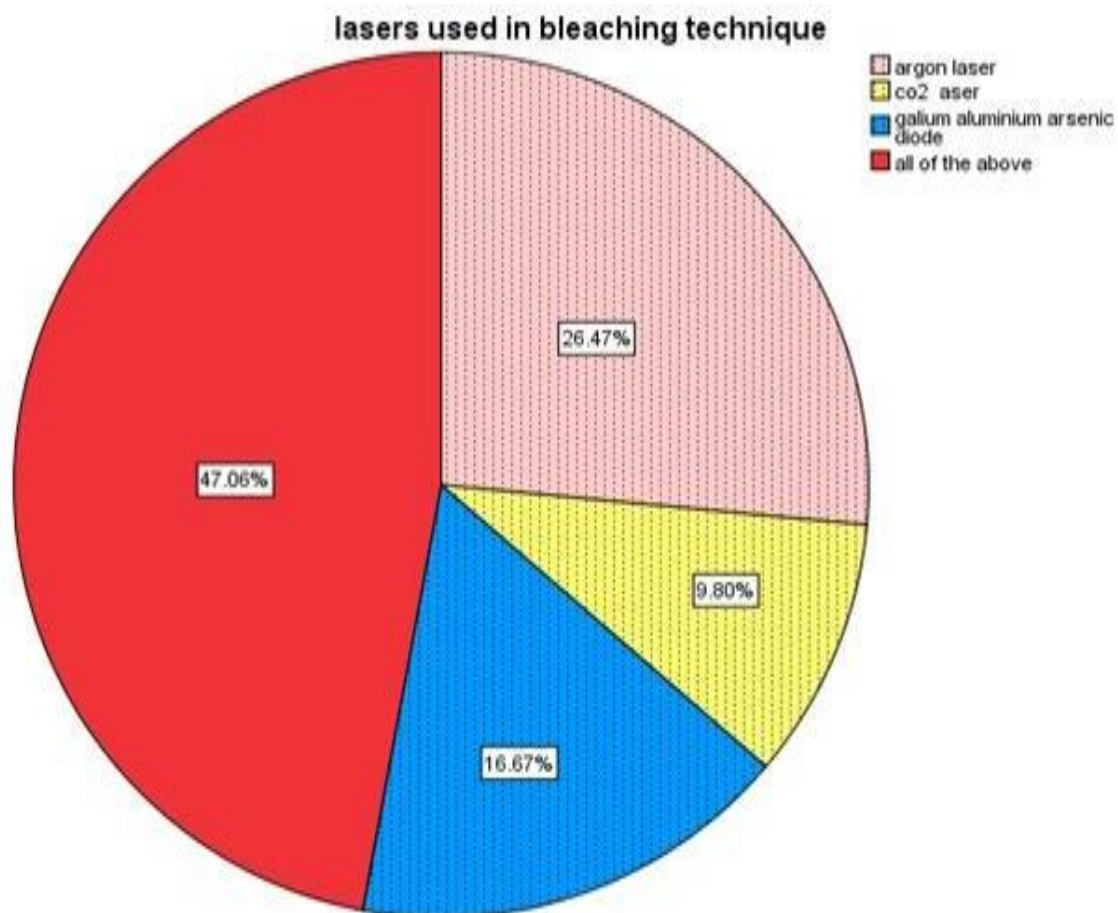


Figure 12: Shows percentage of responses from the students for lasers used in bleaching. Light pink with dots represents argon laser, yellow with dots for CO₂ laser, Blue with dots for gallium aluminium arsenic diode, red for all of the above. Majority of students around (47.06%) were aware about lasers while others chose argon lasers (26.47%), 16.67 (gallium aluminium arsenic diode), 9.80% (CO₂ laser) were unaware about the lasers used in bleaching.

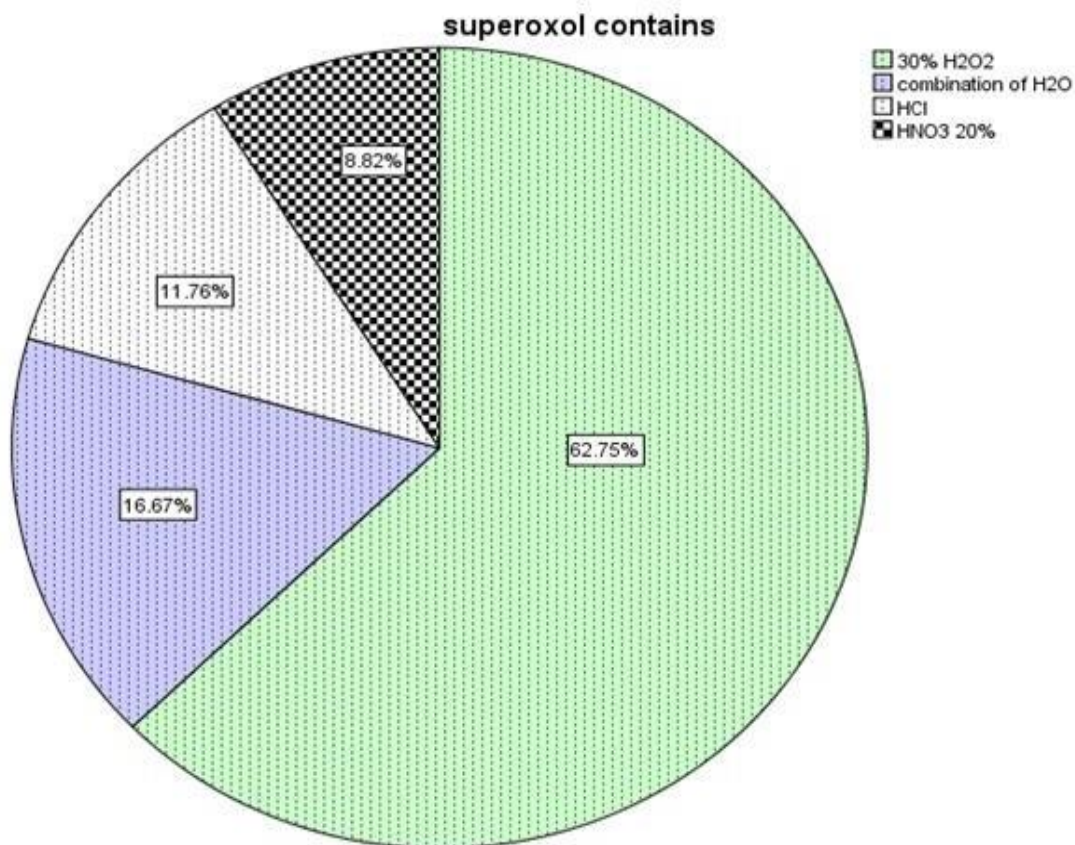


Figure 13: Shows the percentage of responses from the students for contents of superoxol. Light green with dots represents 30% H₂O₂, lavender with dots for HCl, white with dots for combination of H₂O, checkerboard pattern for nitric acid. The majority of students (62.75%) were aware of 30% H₂O₂ while 16.67% (combination of H₂O), 11.76% (HCl), 8.82% (HNO₃) were unaware about the contents of superoxol.

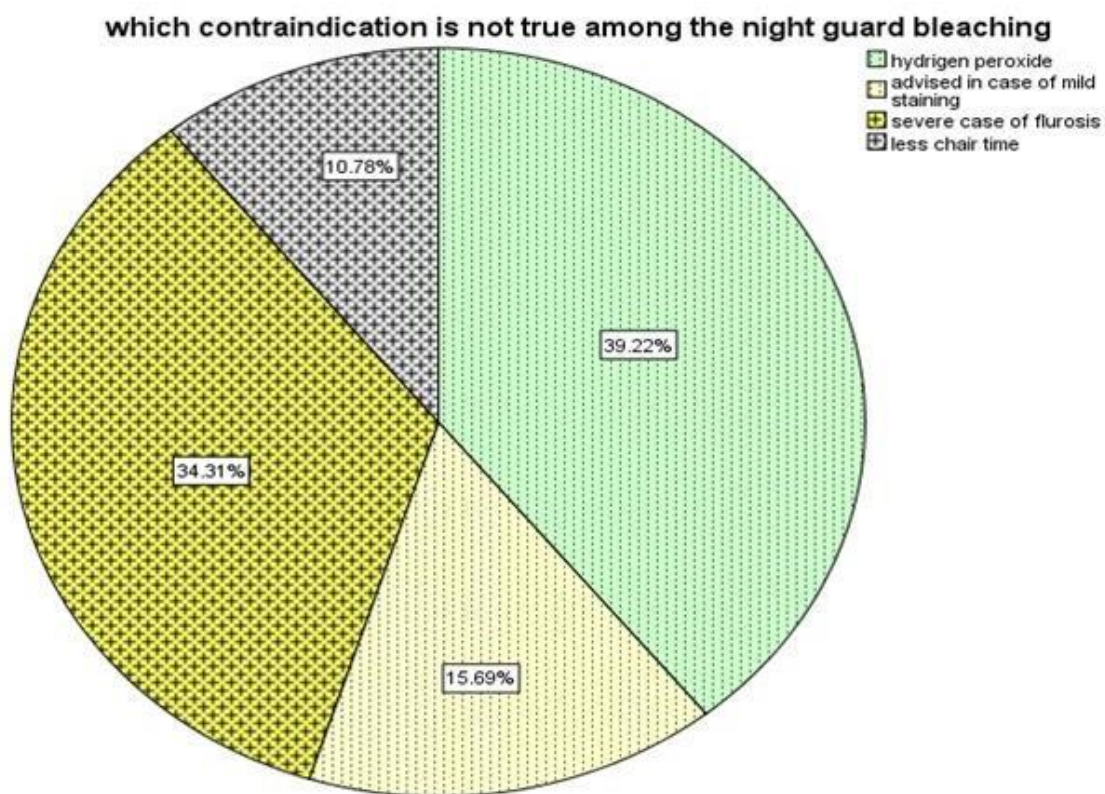


Figure 14: Shows the percentage of responses of the students for night guard bleaching. Light yellow with dots represents H₂O₂, star shaped yellow for severe fluorosis, green combination for mild staining, grey with dots for less chair time. About 39.22% (Hydrogen peroxide), 34.31% (severe case of fluorosis), 15.69% (mild staining) were aware while 60% of the students were unaware about night guard bleaching.

Discussion

In this study, third year students have more knowledge about these questions present in the questionnaire. Many bleaching systems which have become popular within the past few years(28). Everyone's adaptability is different towards whitening procedures. Some people respond well to tooth bleaching, while people with different teeth shade or other serious discoloration may require porcelain veneers or bonding.

In-office bleaching in combination with take-home bleaching using hydrogen peroxide is an excellent option for esthetic and conservative treatment of teeth that have been chromatically altered. Office and home bleaching often leads to uncomfortable situations. (29) In this study about 48% of the third year students were aware about this bleaching technique.(Figure 3)

The dental bleaching are oxidizing agents used in teeth bleaching like Hydrogen peroxide(H_2O_2) with concentrations between 3% and 40% leads to the formation of free radical hydroxyl, which penetrate the dental enamel and eliminate the coloring substances(30). 66% of the students were aware about the formation of free radical hydroxyl (Figure 7)

The occurrence of problems has diminished the usage of milder peroxide (that is, home bleaching), or gels for short time applications. In this study, 34% of participants are aware of night guard bleaching which is a novel method. Combination of hydrogen peroxide with heat is causing discomfort for some researchers. Bleaching is not that effective when the real or original tooth itself is greyish(31).

There are several different methods used for tooth colour in bleaching studies(32). ADA program is used for any shade guides for electronic colour measurement devices(33) It is one of the finest innovative techniques. No proof is there to show that light activation (power bleaching with high-intensity light) gives better bleaching with an effect that has a longer span(34). Laser light is different from conventional light as it needs a laser-target point. In some cases patients find bleaching discomfort but the reason is not known (2). In this study, 45% of participants were aware of light sources used in tooth bleaching.

Limitations: This study was done among a smaller group of people in a shorter time span; hence it has to be done among a larger population for better results. The future scope is to erase all the gap of knowledge between the dental students about the tooth bleaching.

Conclusion.

It is concluded that third year students were more aware about tooth bleaching when compared to others. However, in many students the content and understanding has evaporated. More stress on this topic will help them to enhance their knowledge and focusing more on the subject will improve and also many first years who have no knowledge have also done well. More focus on this topic can widen the students' boundaries. Also repetition of the tooth bleaching topic is very much required as the facts are very transient.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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