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Assessment of Knowledge, Attitude and Practice Based Survey Towards Successful Restorations of Composite Among practitioners

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Abstract: Composite resins are currently the most popular of all tooth coloured restorative materials, which completely replaced silicate cement and acrylic resin as esthetic restorative materials. Aesthetically pleasing restorations are much desirable in current day dentistry and efforts have been made to develop a restorative material to suit the patient's desired needs. The present study by means of a close ended questionnaire evaluates the knowledge, attitude and practice of the endodontists, general dentists, postgraduates and undergraduates towards successful restoration of composite. An online survey form, close ended questionnaires was distributed randomly among 150 respondents. Questions related to 5 knowledge, 5 attitude and 5 practice were presented. All the data was compiled and tabulated in Microsoft Excel and exported to IBM SPSS 20 software and data was represented through chi square tests performed for the comparison between Endodontists, General dental practitioners, Postgraduates and undergraduates. Results were obtained and depicted as graphs which showed the knowledge score as 53.16%, attitude score as 63.82% and practice score as 62.4%. Participants were of mean age groups of 31-40 years of age. More Continuing Dental Education Programmes(CDE),seminars and other educational programmes are required to strengthen the deficit in knowledge and improve treatment planning skills among postgraduate students of Endodontics. Within the limitations of the study, it shows that knowledge with regard to successful composite restoration is moderate, compared to attitude and practice among respondents. It is recommended there is a need for continued professional education and clinical training of the dentists towards all aspects related to composite restorations in order to achieve desired results and esthetics within a stipulated time.

Keywords: Acid etching, Bonding agent, Composites, Finishing, Isolation and Questionnaire, Innovative technique

INTRODUCTION

With the growing sense and awareness of beauty and Fashion, aesthetic restorations are an inseparable part of modern day conservative dentistry and ever since efforts have been made to develop a restorative material to suit the patient desires and needs. Composite resins are currently the most popular of all tooth coloured restorative materials, which have completely replaced silicate cement and acrylic resin as esthetic restorative material(Jose, P. and Subbaiyan, 2020). It consists of a continuous polymeric (or) resin matrix in which a filler is dispersed. With the development of acid etch technique (Bunocore -1955) and dentin bonding agents, the marginal seal and bonding of composite to the tooth structure has drastically improved and thereby adding longevity to the restoration (Ravinthar and Jayalakshmi, 2018).

Based upon the filler particles size, composites are classified as megafill (0.5-2mm), macrofill(10-100u), midifill(1-10u), minifill(0.1- 1u), microfill(0.01% 0.1u) and nanofill(0.001- 0.1u). Composites with mixed ranges of particle sizes are called hybrids (Nandakumar and Nasim, 2018). Composites materials in the market which are used for restorations show promising results and despite excellent aesthetic results and good strength values (Teja, Ramesh and Priya, 2018). Due to polymerization shrinkage they are prone to marginal leakage,

post operative sensitivity and secondary caries(Janani, Palanivelu and Sandhya, 2020),(Manohar and Sharma, 2018).

Our university is passionate about research we have published numerous high quality articles in this domain over the past years ((Kavitha *et al.*, 2014) , (Praveen *et al.*, 2001),(Devi and Gnanavel, 2014), (Putchala *et al.*, 2013), (Vijayakumar *et al.*, 2010), (Lekha *et al.*, 2014a, 2014b) (Danda, 2010) (Danda, 2010) (Parthasarathy *et al.*, 2016) (Gopalakannan, Senthilvelan and Ranganathan, 2012), (Rajendran *et al.*, 2019), (Govindaraju, Neelakantan and Gutmann, 2017), (P. Neelakantan *et al.*, 2015), (PradeepKumar *et al.*, 2016), (Sajan *et al.*, 2011), (Lekha *et al.*, 2014a), (Neelakantan, Grotra and Sharma, 2013), (Patil *et al.*, 2017), (Jeevanandan and Govindaraju, 2018), (Abdul Wahab *et al.*, 2017), (Eapen, Baig and Avinash, 2017), (Menon *et al.*, 2018), (Wahab *et al.*, 2018), (Vishnu Prasad *et al.*, 2018), (Uthrakumar *et al.*, 2010), (Ashok, Ajith and Sivanesan, 2017), (Prasanna Neelakantan *et al.*, 2015). The aim of this survey was to assess the knowledge, attitude and practice of a successful composite restoration among endodontists, general dentists, postgraduates and undergraduates.

MATERIALS AND METHODS

This survey was conducted in May 2020 among Endodontists,General dental practitioners, PG students in endodontics and undergraduates.This questionnaire based survey consisted of 15 questions with multiple choice and questionnaire was divided into demographic data, knowledge based, attitude based and practice based. The questionnaire was circulated via electronic media through mail.

Data was collected and statistical analysis was to be performed.The data was tabulated in Microsoft Excel followed by the exporting of the data to IBM SPSS software 20. The tabulated and converted data is analysed through SPSS. Chi square test was performed in order to check for the comparison of responses amongst the Endodontists,general dental practitioners, PG students in endodontics and undergraduates.The significance level was set at 0.05.

RESULT AND DISCUSSION

A total of 150 responses were received from the respondents in which 56% were females and 44% males. 20% of the participants were of the age group 19-25 years, 33% were in the age group of 25- 30 years, 38% were in the age group of 31-40 years and 8.6% were in the age group of 41-50 years. Majority of the participants were General dental practitioners 44% followed by PGs in endodontics 29% [Table1]. In the present study,on assessing the association between the respondent groups and their responses to the brand of composite used, general dental practitioners have better knowledge regarding brand of composite than others,but it was not statistically significant ($p>0.05$)[Figure 1].on assessing the association between the respondents groups and their responses as to number of shades used for anterior teeth, general dental practitioners have better knowledge regarding number of shades used for anterior teeth than others, but it was not statistically significant ($p >0.05$)[Figure 2].On assessing the association between the respondents groups and their responses as to methods of isolation,general dental practitioners have better knowledge regarding number of shades used for anterior teeth than others, but it was not statistically significant ($p >0.05$) [Figure 3].on assessing the association between the respondents groups and their responses as to preferred generation of bonding agent,general dental practitioners have better knowledge regarding preferred generation of bonding agent, than others, but it was not statistically significant ($p >0.05$) [Figure 4].on assessing the association between the respondents groups and their responses as to preferred bonding agent, general dental practitioners have better knowledge regarding preferred bonding agent than others, but it was not statistically significant ($p>0.05$) [Figure 5].on assessing the association between the respondents groups and their responses to time taken for etching (fifth generation),general dental practitioners have better knowledge regarding time taken for etching (fifth generation) than others but it was not statistically significant ($p >0.05$)[Figure 6]. On assessing the association between the respondents groups and their responses as to techniques to place composites,general dental practitioners have better awareness regarding techniques to place composites than others, but it was not statistically significant ($p >0.05$) [Figure 7].On assessing the association between the respondents groups and their responses as to methods to check for curing light intensity,general dental practitioners have better awareness regarding techniques to place composites than others, but it was not statistically significant ($p >0.05$) [Figure 8]. On assessing the association between the respondents groups and their responses as to frequency to clean fiber optic tip. general dental practitioners have better awareness regarding than others,but it was not statistically significant ($p > 0.05$) [Figure 9]. Depending on the attitude of participants regarding the long term success for placing composite restorations, general dental practitioners have better awareness than others, but it was not statistically significant ($p>0.05$) [Figure 10]. on assessing the association between the respondents groups and their responses regarding matrix band used in posterior composite restorations, 24.67% of general dental practitioners,15.33% were post graduates, 12.63 % were undergraduates and 6.67% were endodontist suggested for palodent matrix band for posterior composite restorations,but it was not statistically significant ($p >0.05$) [Figure 11].

The success of a composite restoration depends on various clinical conditions like operating field, type of isolation and composite, type of bonding system, method of placing composite in the cavity (oblique layering technique/ incremental placement), time and type of finishing and polishing of composite restoration (Hussainy *et al.*, 2018), (Rajendran *et al.*, 2019). According to parpaiola AR et al., the main cause of restoration replacement was composite shade discolouration (63.8%) followed by marginal staining (50%) , unsatisfactory restoration anatomy (50 %) , marginal fracture (14.9%) , painful symptoms (8.5%) , fractured restoration body (4.3%) dental fracture (1.1%) and total displacement of the restoration (1.1%). Marginal staining and composite shade discolouration with the dental structure were related to the presence of caries.

According to a survey, the major cause for initial restoration is dental caries, while that for re-restorations was secondary caries (36.2%) followed by Endodontic root canal therapy (22.2%) discolouration of the restoration (14.4%) , restorative technique failures (13.4%), composite restorations fracture (11.3%) , pain and sensitivity (2,4%) (Ramanathan and Solete, 2015). The composite resin contracts by about 1.5% to 5% and the mode of polymerization Of composite resin is free radical polymerization. Significant polymerization shrinkage results in gap formation, secondary caries, marginal leakage , and post operative sensitivity (Ramamoorthi, Nivedhitha and Divyanand, 2015; R, Rajakeerthi and Ms, 2019). The incremental filling technique of composite restoration has been recognised as the technique of choice to minimise polymerization shrinkage stresses. The incremental filling technique yielded significantly lower cuspal deflection than the bulk filling technique in a previous study (Siddique *et al.*, 2019). Previous studies show that 95% dentists in Srinagar and 85% of dentists in Delhi used Incremental layering technique. Traditionally mylar strips, tofflemire band and retainer , Ivory and S band retainer have been used for developing contact and contour in lesions involving proximal walls. But now we have better matrix system like palodent plus (DENTSPLY), sectional matrix plus retainer system (3M) , V3 ring (Triodent) , optra matrix (Ivoclar) specially designed to assist clinicians in creating precise automatically shaped contact points in cavities involving proximal walls (Noor, S Syed Shihaab and Pradeep, 2016; Siddique *et al.*, 2019). In our survey we found mylar strip and tofflemire band and retainer to be the most popular and palodent were used by 60.8% dentists, when compared to a study which was done in Srinagar, it was 10% and 21% in Delhi (Kumar and Delphine Priscilla Antony, 2018).

According to a survey done in 2010, 63% did not use a rubber dam for any restorative procedures. In our survey , we found that only 5% of dentists use rubber dams as a method of isolation(Parpaiola *et al.*, 2009; Teja and Ramesh, 2019, 2020). In the present survey, we found that (66.7%) of respondents use Rubber dam, cotton rolls & suction tips as their method of Isolation (Gurgan *et al.*, 2020). The 42% of respondents used prime and bond NT (DENTSPLY) and the reasons cited for the popularity were its availability, ease of use and reliability. The previous study compared microleakage of fifth, sixth and seventh generation bonding agents and found the preparations treated with clear fill S3 (7th generation DBA) showed significantly less leakage than the other groups. In our survey we found that 7 th generation bonding system is most popular and xeno V is the most preferred brand of 7 th generation bonding system followed by the 5 th generation bonding system. 34% of the respondents (Al-Negrish, 2002). Strength of tooth - restoration interface is also a function of etching time when using 5 th generation bonding system (Manappallil, 2016). Few studies resin to enamel bond strengths with various etching times and concluded that 5 - second etch was sufficient to allow for adequate bond strength.other studies also found that Phosphoric acid gels (35%) and (10%) Maleic acid applied for 15 seconds and 60 seconds removed the smear layer and opened the dentinal tubule orifices. Thus it may be postulated that over etching is not required ('Resin-to-enamel bond strengths with various etching times', 1992). Light output needs to be checked routinely in order to obtain desirable results. Hedge V conducted a clinical survey of the output intensity of 200 light curing units in dental offices across Maharashtra and found only 10% LED units and 2% QTH curing lights in good intensities (Steiner *et al.*, 2019). (>400MW/Cm). A similar study found that the light intensities of the curing light units used in private practice were lower than expected. Martin et al., checked in a survey reported that nearly 50% of dentists had never checked the light output of their units and over one half of the light curing units were not functioning satisfactorily. The effects of light intensity and light curing time on the degree of polymerization of dental composites resins and found that light curing composite resins with higher energy density was beneficial to acquiring higher microhardness values and lower coefficients of thermal expansion (Gilbert *et al.*, 2010). Coelho santos MJ et al studied the effect of light curing method on volumetric polymerization shrinkage of resin composites and found that is hybrid composites (z-100),continuous output with higher shrinkage than continuous output with conventional intensity light method and pulse- delayed output.Jose R David et al., studied the effects of curing time on curing efficiency and found significant increase in microhardness values for all light curing composites, when exposure time was increased from 20 to 40 seconds. In our survey we found that 59.3% respondents cured for 20 seconds, while 25% of respondents in Srinagar and 24 in Delhi cured for 40 seconds (Kwon, Ferracane and Lee, 2012),(Vinay and Shivanna, 2010)

Finishing and polishing of composite resins enhances the esthetics as well as increase the longevity of the restoration. The survival rate of composite resin was found to be 91.7% at 5 years and 82.2% for 10 years. For amalgam the survival was 89.6% at 5 years and 79.2% at 10 years (Yamazaki *et al.*, 2006). Lopes et.al.,GC at

sealing ability of composites restoration materials which is microfilled composite restorative material placing on dentin margins, it significantly had lower microleakage scores.In our study ,we found that about 60% respondents finished and polished composites resin post operative,y immediately after the restoration and about 40% did it 3 -7 days post operatively. The most popular system used to finish and polish composite resins is shove supersnap (greater than 60%).

CONCLUSION

Within the limitations of the study, it shows that knowledge with respect towards successful composite restoration is moderate, compared to attitude and practice among respondents. It is recommended there is a need for continued professional education and clinical training of the dentists towards composite restorations in order to achieve desired results and esthetics within a stipulated time.

Conflict of Result

There is no conflict of interest

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Table 1. showing Demographic Data of participants ,56% were females and 44% were males. 20 % of the participants were of the age group 19-25 yrs, 33% were in the age group of 25-30 yrs, 38% were in the age group of 31- 40 yrs and 8.6% were in the age group of 41-50 yrs. Majority of the participants were General dental practitioners 44% followed by PGs in endodontics 29% and 22 % were undergraduates followed by 9.3% were endodontists.

Demographic variables	Categories	No.of respondents	Percentage %
Gender	Male Female Total	66 84 150	44 56 100
Age (years)	19-25 years 25-30 years 31-40 years 41-50 years	30 49 58 13	20 33 38 8.6
Field of practice	Endodontist Post graduates General Dental practitioners Undergraduates	33 36 67 16	9.3 29 44.4 22

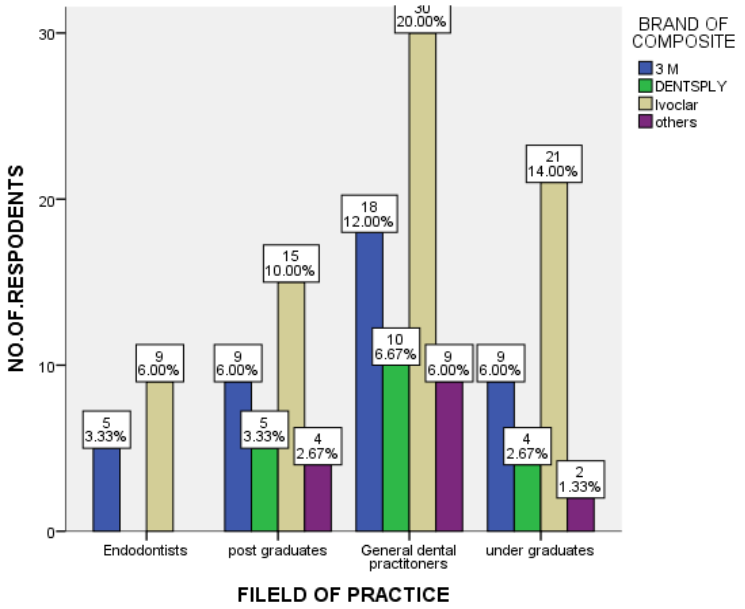

Fig.1: Bar chart showing association between the respondent groups and their responses as to the brand of composite used. X- axis denotes the field of practice, Y-axis denotes the number of respondents.The association was analyzed using chi square test, [Pearson chi square value= 7.332[a] ; df-9; p= .603 (p>0.05),statistically not significant; implying that though general dental practitioners have better knowledge regarding brand of composite than others, there was no major difference among the groups studied .

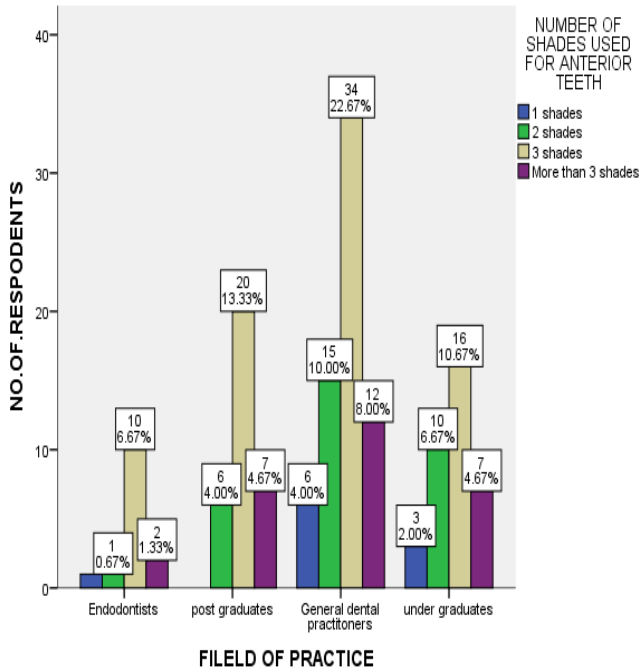

Fig.2 : Bar chart showing association between the respondents groups and their responses as to number of shades used for anterior teeth.X- axis denotes the field of practice, Y-axis denotes the number of respondents.The association was analyzed using chi square test [Pearson chi square value= 7.187[a] ; df-9; p= .618 (p>0.05) statistically not significant,implying that though general dental practitioners have better knowledge regarding number of shades used for anterior teeth than others, there was no major difference among the groups studied.

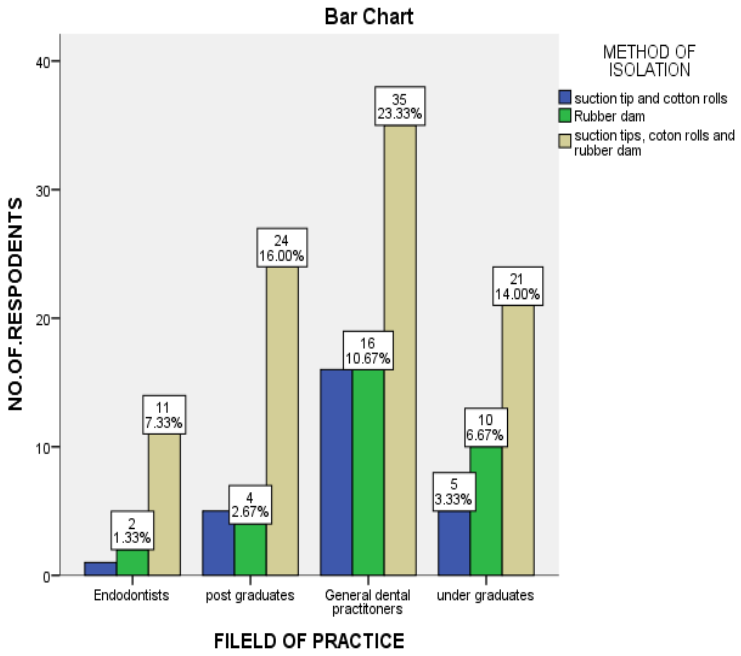

Fig.3: Bar chart showing association between the respondents groups and their responses as to methods of isolation,X- axis denotes the field of practice, Y-axis denotes the number of respondents.The association was analyzed using chi square test,[Pearson chi square value= 7.582[a] ; df-6; p= .270 (p>0.05), statistically not significant,implying that though general dental practitioners have better knowledge regarding number of shades used for anterior teeth than others, there was no major difference among the groups studied.

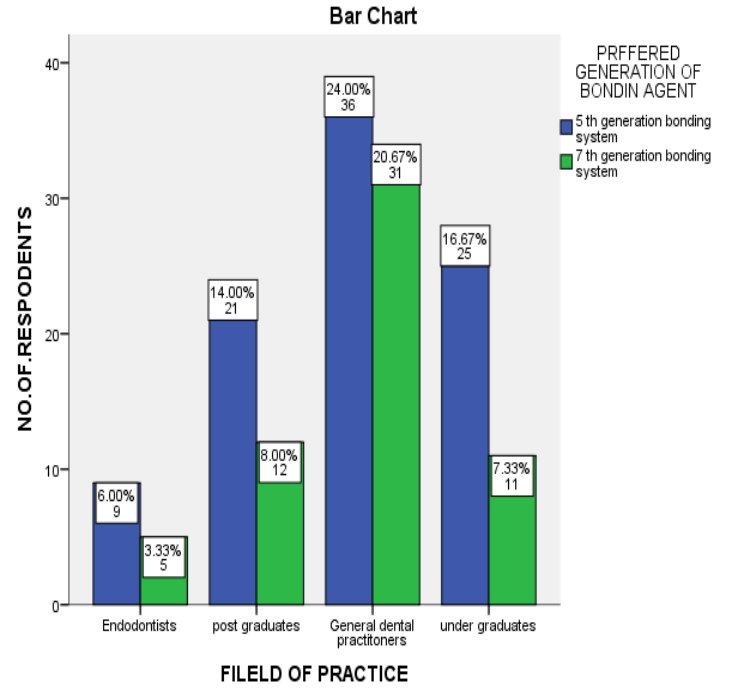

Fig.4 : Bar chart showing association between the respondents groups and their responses as to preferred generation of bonding agent,.X- axis denotes the field of practice, Y-axis denotes the number of respondents,The association was analyzed using chi square test [Pearson chi square value= 2.712[a] ; df-3; p= .438 (p>0.05) statistically not significant,implying that though general dental practitioners have better knowledge regarding preferred generation of bonding agent, than others, there was no major difference among the groups studied.

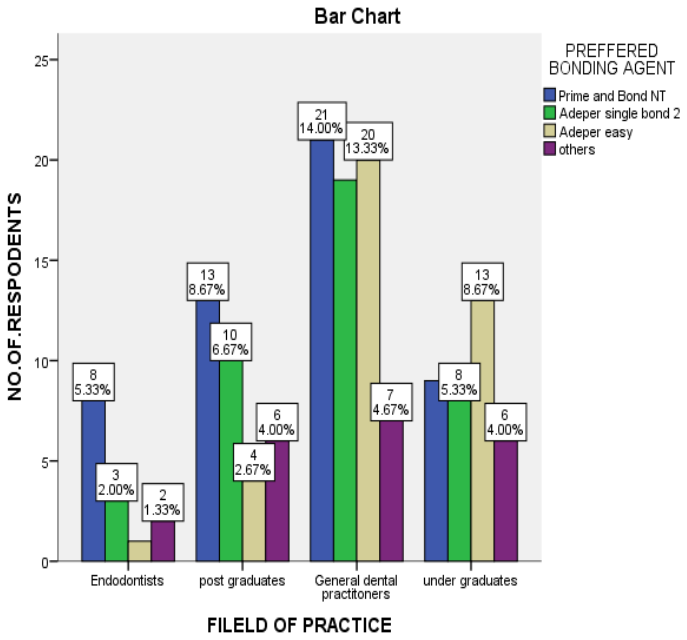

Fig.5: Bar chart showing association between the respondents groups and their responses as to preferred bonding agent,X- axis denotes the field of practice, Y-axis denotes the number of respondents.The association was analyzed using chi square test and was found to be statistically not significant, [Pearson chi square value= 11.623[a] ; df-9; p= .235 (p>0.05), implying that though general dental practitioners have better knowledge regarding preferred bonding agent than others, there was no major difference among the groups studied.

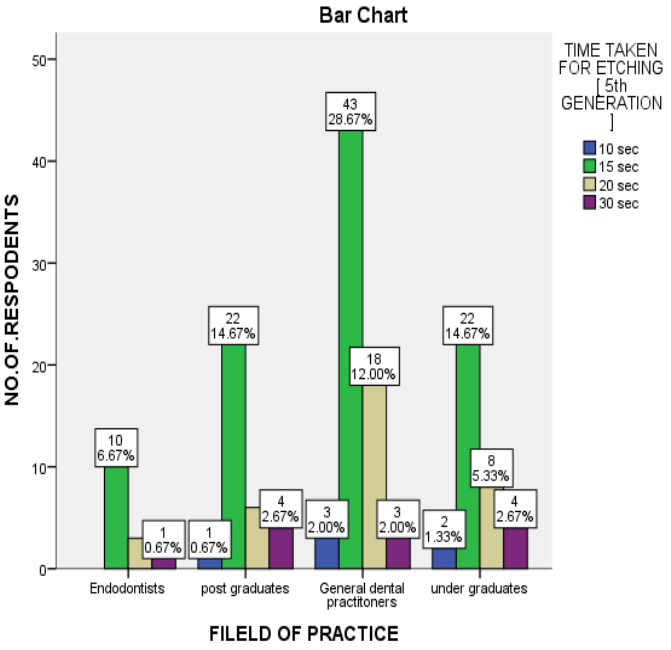

Fig.6 : Bar chart showing association between the respondents groups and their responses to time taken for etching (fifth generation), X- axis denotes the field of practice, Y-axis denotes the number of respondents.The association was analyzed using chi square test [Pearson chi square value= 4.098[a] ; df-9; p= .908 (p>0.05) and was found to be statistically not significant,implying that though general dental practitioners have better knowledge regarding time taken for etching (fifth generation) than others, there was no major difference among the groups studied.

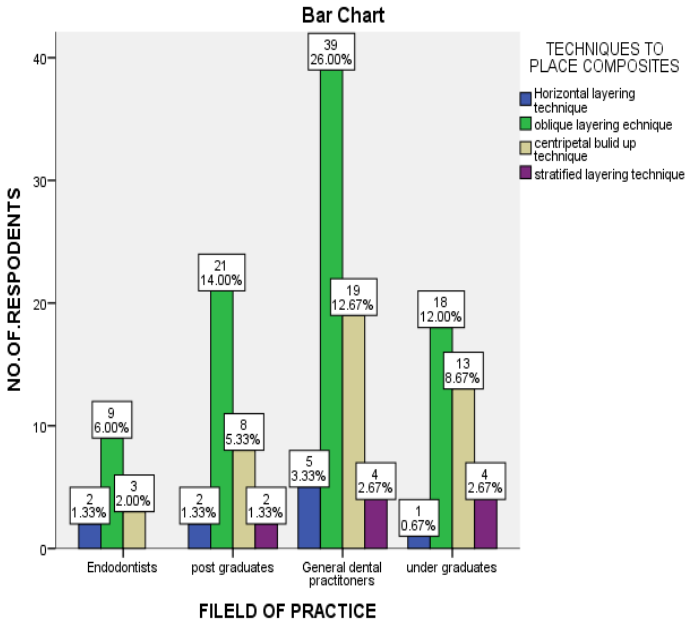

Fig.7: Bar chart showing association between the respondents groups and their responses as to techniques to place composites. X- axis denotes the field of practice, Y-axis denotes the number of respondents.The association was analyzed using chi square test [Pearson chi square value= 6.038[a] ; df-9; p= .736 (p>0.05),statistically not significant, implying that general dental practitioners have better awareness regarding techniques to place composites than others, there was no major difference among the groups studied.

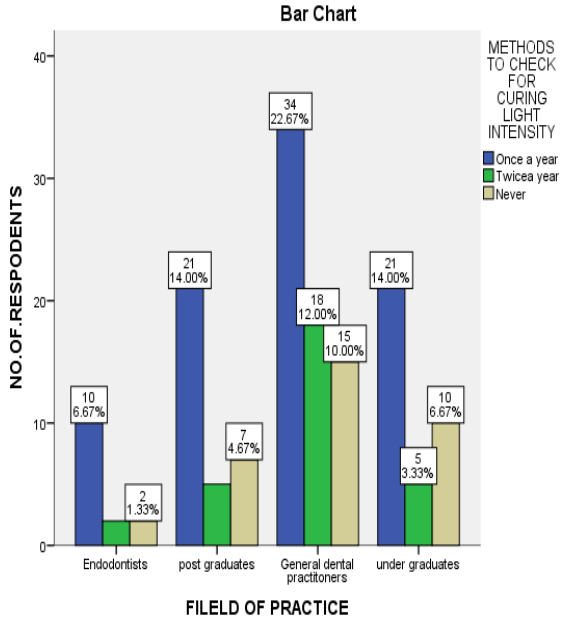

Fig.8: Bar chart showing association between the respondents groups and their responses as to methods to check for curing light intensity. X- axis denotes the field of practice, Y-axis denotes the number of respondents,The association was analyzed using chi square test[Pearson chi square value= 4.977[a] ; df-6; p= .547 (p>0.05) statistically not significant,implying that general dental practitioners have better awareness regarding techniques to place composites than others, there was no major difference among the groups studied.

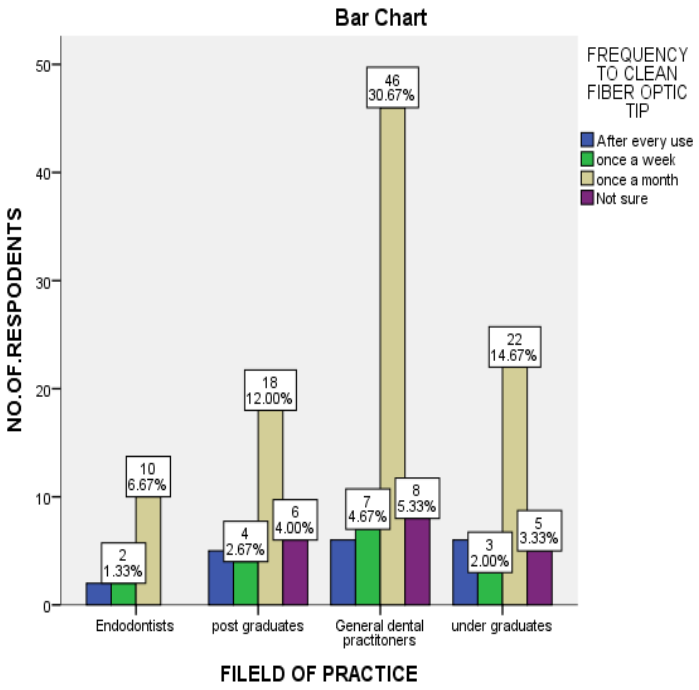

Fig.9 : Bar chart showing association between the respondents groups and their responses as to frequency to clean fiber optic tip. X- axis denotes the field of practice, Y-axis denotes the number of respondents.The association was analyzed using chi square test and was found to be statistically not significant, [Pearson chi square value= 4.098[a] ; df-9; p= .808 (p>0.05), implying that general dental practitioners have better awareness regarding than others, there was no major difference among the groups studied.

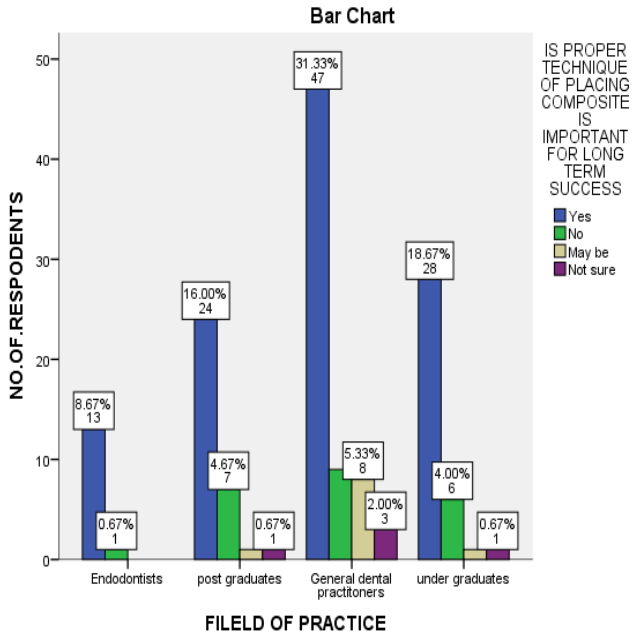

Fig.10 : Bar chart showing association between the respondents groups and their responses as to long term success for placing composite restorations f.X- axis denotes the field of practice, Y-axis denotes the number of respondents.The association was analyzed using chi square test [Pearson chi square value= 8.395[a] ; df-9; p= .495 (p>0.05),statistically not significant,implying that general dental practitioners have better awareness regarding than others, there was no major difference among the groups studied.

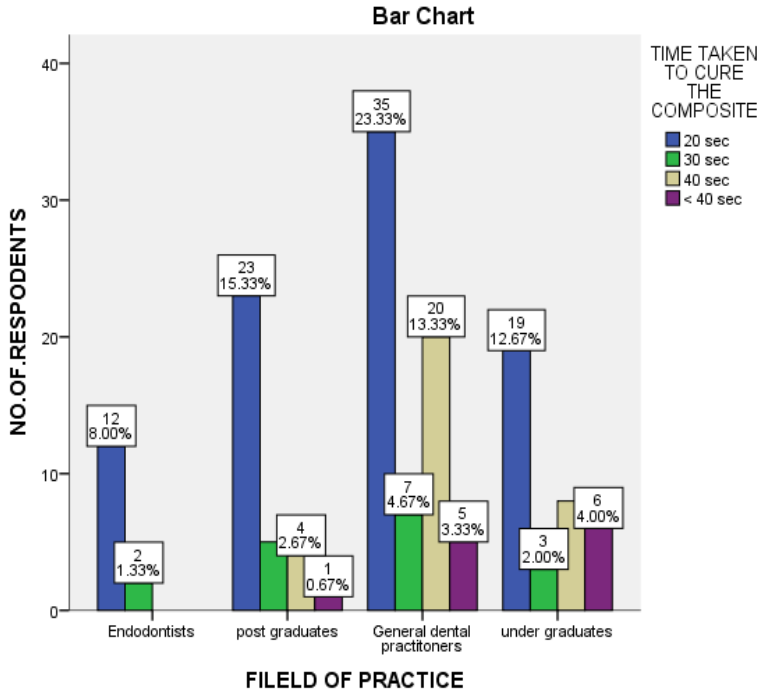

Fig.11: Bar chart showing association between the respondents groups and their responses as to time taken to cure the composite.X- axis denotes the field of practice, Y-axis denotes the number of respondents.The association was analyzed using chi square test [Pearson chi square value= 16.067[a] ; df-9; p= .065 (p>0.05) statistically not significant,implying that general dental practitioners have better awareness than others, there was no major difference among the groups studied.

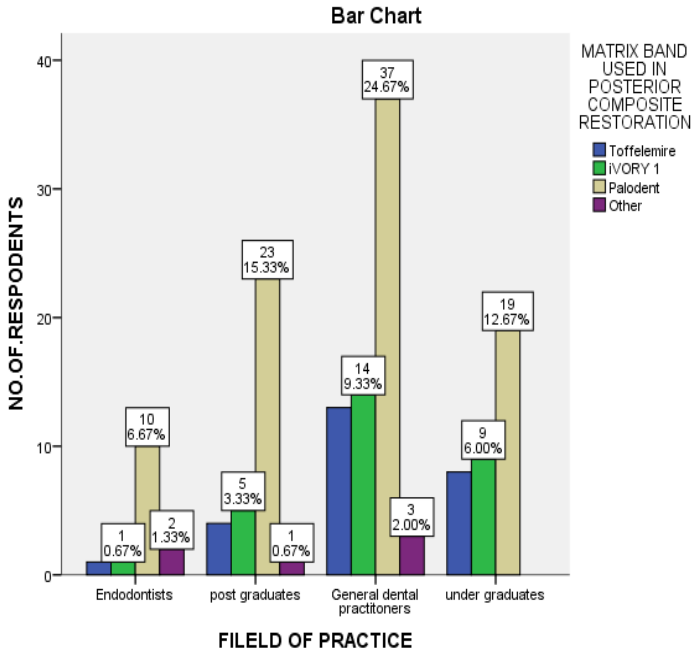

Fig.12: Bar chart showing association between the respondents groups and their responses as to matrix band used in posterior composite restorations..X- axis denotes the field of practice, Y-axis denotes the number of respondents. The association was analyzed using chi square test [Pearson chi square value= 10.728[a] ; df-9; p= .295 (p>0.05), statistically not significant,implying that all practitioners recommend palodent matrix band to use for posterior composite restorations,no major difference among the groups studied.

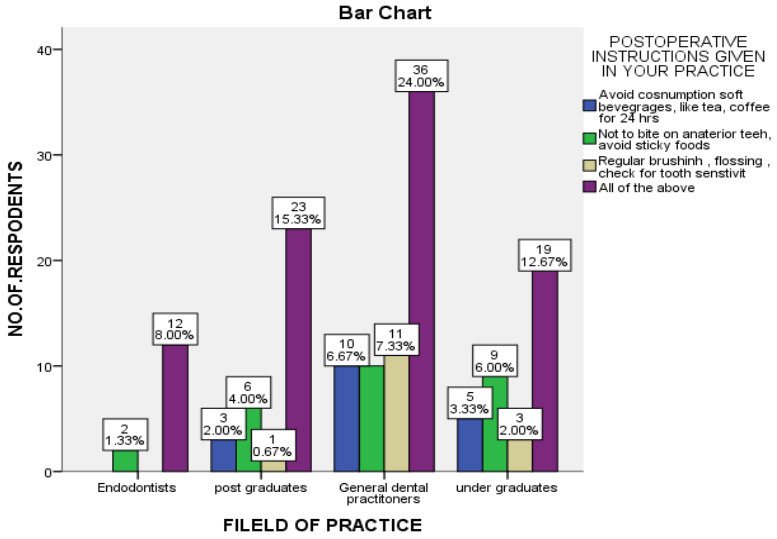

Fig.13: Bar chart showing association between the field of practice of the participants and responses post operative instructions.The association was analyzed using chi square test [Pearson chi square value= 12.612[a] ; df-9; p= .181 (p>0.05) statistically not significant, implying that all practitioners recommend all of the above options to be given in post operative instructions, no major difference among the groups studied.