Journal of Contemporary Issues in Business and Government Vol. 27, No. 2, 2021
https://cibg.org.au/

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.329

Kap Survey on Management Of Defective Composite Restorations Among Dental Practitioners In Chennai

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Abstract: Background :Development of dental materials plays a significant role in dental practice from mechanically focused to a more biologically focused dentistry. Repair or replacement of dental restorations is one of the most common procedures performed by the dental practitioners. Defective composite restoration was replaced but more conservative treatment like repair has been advocated in the recent past.
Aim : The aim of the present study is to investigate the knowledge, attitude and practice on management of defective composite restoration among dentists in chennai.
Methods :A cross-sectional questionnaire based study was conducted in 2020 among dental practitioners in chennai. Survey questionnaires were prepared, using an online survey portal and it was distributed randomly to 105 dentists via google forms. The obtained results were statistically analysed using SPSS and the graphs were plotted.
Results : Majority of the participants considered that repair was less time consuming and most of the respondents agreed that repair increased the longevity of a previously restored defective composite restoration. The obtained results state that repair of composite restoration is practiced more widely than replacement.There was no significant association between the field of practice of the dentists (specialists/ general practitioners) and their response to the question for the majority of the survey questions
Conclusion : Based on the results of this survey, majority of dentists perform repair of composite restoration rather than replacement to treat small defects in composite restoration.

Keywords : Dental caries, Composite restoration, Repair, Replacement

INTRODUCTION:

Development in dental materials plays a significant role in dental practice in recent times as the shift from a "mechanically focused" to a more "biologically focused" approaches across the spectrum of dentistry, with an emphasis on minimal invasive treatment (Banerjee, 2013). Composite restorations allow for minimally invasive or no preparation at all when assuming the replacement of decayed or missing tissues which gives thinking to a new concept called Bio Esthetics (Zachrisson and Mjör, 1975). The restoration of teeth has many problems due to loss of tooth structure by caries, trauma,fracture,previous, restoration and endodontic therapy, all of which reduce the fracture resistance of the healthy tooth (Morgano, Rodrigues and Sabrosa, 2004). The advantages of restoration techniques, include the avoidance of excessive loss of healthy tooth tissue to create mechanical retention and facilitate the placement of certain restorations as well as reduction in the need for subsequent advanced restorative maintenance, often involving restoration replacement and financial outlay for the patient of oral health care (Lynch et al., 2013). Defects in restorations and lesions of secondary caries adjacent to restoration margins are the most frequent clinical observations that can be seen in dental practice (Mjör, Moorhead and Dahl, 2000). Repair or replacement of dental restorations is one of the most common procedures performed by the dental practitioners (Gordan, Riley, Geraldeli, et al., 2012)(Sharif, Catleugh, et al., 2010). A localized defect in a composite restoration repair is the partial replacement of a defective restoration showing no clinical or radiographic signs of failure whereas restoration replacement is the complete removal of previous restoration followed by placing a new restoration (Blum, Jagger and Wilson, 2011).
Good – decision making in respect of "defective" restoration is central to effective restorative treatment planning, particularly given the growing body of evidence confirming the value and importance of procedures to repair defective restoration (Kay et al., 1988). Repairing resin composite restorations for small defects is a justifiable alternative to complete replacement. This is also supported, that the majority of the defects are

localized in nature like secondary caries (Farooq et al., 2019). Composite restoration suffers a lot of mechanical insult during service as they undergo deterioration and wear. These insults can be attributed to several factors eg: polymerization shrinkage, high co effective of thermal expansion, low abrasion resistance, patient's oral hygiene and in appropriate placement techniques (Blum, Lynch and Wilson, 2014)(Ravinthar and Jayalakshmi, 2018). Conventionally, a defective composite restoration was replaced but recently repair is a conservative treatment option that has been advocated. Complete replacement of a composite restoration may be considered unduly interventional in conditions where the restoration replacement may be found to be healthy clinically and radiographically (Gordan, Riley, Worley, et al., 2012). There are many different advantages of repairing rather than replacement of a restoration are preservation of tooth structure, reduction of potentially harmful effects on the dental pulp, no need for local anesthesia provided the repair is not extensive, and reduction in treatment times (Lynch et al., 2010)(Nasim and Nandakumar, 2018). Reduced costs to the patient, patient 's acceptance, slowing the restoration death spiral and increased longevity of the restoration are the importance of repair (Lynch, McConnell and Wilson, 2006). It is estimated that 56% of restoration placed by dentist are replacement restoration placed by dentist are rather than restorations placed in the management of new lesion caries (Deligeorgi, Mjör and Nairn Hf H, 2001). The caries occurring at the margins of a restoration are in reality new lesions of caries rather than 'recurrent' caries means the localized repair of defective restoration rather than total restoration replacement is possible. Repaired restorations in permanent teeth have the same or increased longevity compared with replacement restoration. This provides the defect and to repair the restoration with minimal intervention by prolonging the lifespan of the restoration (Morin, DeLong and Douglas, 1984).
Various clinical trials and surveys (Ramamoorthi, Nivedhitha and Divyanand, 2015)-(Manohar and Sharma, 2018), in vitro studies (Ramanathan and Solete, 2015)(Janani, Palanivelu and Sandhya, 2020), reviews (R, Rajakeerthi and Ms, 2019)(Kumar and Delphine Priscilla Antony, 2018) and molecular studies (Siddique et al., 2019)(Teja and Ramesh, 2019) have been conducted by our team in the field of conservative dentistry and endodontics which has paved us the way to take up this survey. The aim of this study is to investigate the knowledge attitude and practice on management of defective composite restoration among dentists in chennai.Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J et al., 2018; Menon et al., 2018; Prabakar et al., 2018; Rajeshkumar et al., 2018, 2019; Vishnu Prasad et al., 2018; Wahab et al., 2018; Dua et al., 2019; Duraisamy et al., 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma et al., 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi et al., 2020; Samuel, Acharya and Rao, 2020)

MATERIALS AND METHODS:

A cross-sectional questionnaire based study was conducted in 2020 related to management of defective composite restorations among dental practitioners in chennai. A total response of 105 were collected. The questionnaire was based on knowledge, attitude and practice regarding the management of defective composite restorations. The questionnaires were circulated in google forms among dentists. It took about 5-10 minutes to complete the survey. The responses of the survey were analysed using SPSS version 22.0 and the graphs were plotted to analyse the responses of the survey. Pearson's chi-square test is used to find if there was an association between two categorical variables.

RESULTS :

Completed responses were received by 105 dentists from Chennai. No incomplete responses were received. The overall responses of the survey was given in table 1. Results of figure 1 shows success and failure of restoration depends on the degree of involvement of caries which was opted by 38.10% of general dental practitioners and 3.81% of specialists. Figure 2 shows 71.43% of general dental practitioners and 16.19% of specialists replaced a defective composite restoration in dental practice. Most common indication of repair is discolouration which was opted by 41.90% of general dental practitioners. Figure 3 shows reason for repair rather than replacement is less time consuming than replacement which was opted by 35.24% of general dental practitioners and 10.48% of specialists. 74.29% of general dental practitioners agreed that minimal intervention treatment includes repair of defects. Figure 4 shows 76.19% of general dental practitioners and 18.10% of specialists agreed that restoration gives extended longevity through the use of repair procedures. Repairing a composite defect will roughen the composite surface which was opted by 65.71% of general dental practitioners. Bur used on the surface of restoration is fine grit diamond bur which was opted by 64.76% of general dental practitioners. Figure 5 shows the sign of the defective composite restoration exhibit is defective margin which was opted by 69.52% of general dental practitioners and 12.36% of specialists. Cause of the defective restoration is marginal leakage which was opted by 61.90% of general dental practitioners. Figure 6 shows the advantage of repair of

composite restoration is reduced risk of harmful effects on the pulp which is opted by 48.57% of general dental practitioners and 11.43% of specialists.

DISCUSSION:

The results of the present study, when taken together with the finding of the related studies indicated that a strong consensus exists among clinical departments of conservative dentistry around the world that merits in repairing rather than replacing defective composite restoration. It should be possible to resolve differences in technique, such as treatment of exposed restoration surfaces and to disseminate and encourage the dental practitioners the adoption of knowledge and skills necessary to effectively apply repair techniques as an approaches that patients, that offers efficiency savings, and that allows especially younger practitioners to practice the minimal interventive techniques (Sharif, Merry, et al., 2010). The repair of defective direct composite restorations is the best way for stronger treatment in operative and conservative dentistry. The replacement or repairing of dental restorations is one of the most common procedures performed by general dentists. These procedures are necessitated by marginal breakdown, restoration failure and recurrent caries. With the increase in frequency of placing composite restorations in posterior teeth and the emphasis on conservative management in restorative care.

Restoration repair has shown promise as a recent cohort study showed that repair can increase restoration longevity as it can minimise tooth reduction associated with replacement. The benefit of minimal interventional approach for treatment of defective restorations is a restored tooth with minimal removal of healthy tooth tissue which is stronger and better able to withstand functional loads resulting in better long term prognosis. A restoration that is replaced tends to be larger than the one it is replacing therefore, extensive restorations have shorter longevity than smaller restorations in clinical service. Defects in composite restorations which are sound both clinically and radiographically, are the most suitable candidates for performing repair; for example defects at the cavo-surface margin, secondary caries, partial loss and discolouration (Lynch and Wilson, 2013). It is critical to select a minimally invasive treatment option for restorations that have already been done to increase the longevity of the tooth (Yousef and Khoja, 2009). Majority of the participants of the survey considered that repair was less time consuming and most of the respondents agreed that repair increased the longevity of a previously restored defective composite restoration (Hickel and Manhart, 2001). Advocated repair of defective composite restorations and practiced them in their day to day practice.

Some of the limitations are the false response and irrelevant answers. Overall consensus by the management of the defective composite restoration by repair and replacement treatment. The scope of the present FDI policy gives guidance on the diagnosis of defective restorations made of various direct and indirect materials using well-established quality assessment criteria based on visual, tactile and radiographic examinations and tooth-and patient-specific criteria. This Policy Statement defines measures for decision making on when and how to repair and when to replace restorations.

CONCLUSION :

Based on the result of this survey, the majority of dentists perform repair of composite restoration rather than replacement to treat a small defect in composite restoration. Repair was less time consuming than replacement of the whole composite restoration. There was no significant association between the field of practice of the dentists (specialists/ general practitioners) and their response to the question for the majority of the survey questions, indicating that teaching restorative techniques during undergraduation influenced the practicing habits of dentists . Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh et al., 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai et al., 2019; Sridharan et al., 2019; Vijayashree Priyadharsini, 2019; Mathew et al., 2020)

AUTHOR CONTRIBUTIONS:

All authors have equal contributions in carrying out this survey.

ACKNOWLEDGEMENT :

I would like to thank the Department of Conservative Dentistry and Endodontics, Saveetha Dental College, Chennai for their valuable inputs in this survey.

CONFLICTS OF INTEREST :

The authors declare no conflict of interest

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TABLES AND GRAPHS:

Table 1: Questionnaires included in the survey and their responses

Questionnaires	**General Dental Practitioners**	**Specialist**	**p-value (<0.05; statistically significant)**
Success and failure of restoration depends on	● The degree of involvement of carious lesion- 40 (38.10%) ● The skill of the operator - 22 (20.95%) ● The properties and limitations of the existing restorative materials - 3 (2.86%) ● All the above - 18 (17.14%)	● The degree of involvement of carious lesion- 4 (3.81%) ● The skill of the operator - 8 (7.62%) ● The properties and limitations of the existing restorative materials - 1 (0.95%) ● All the above - 9 (8.57%)	Pearson's Chi Square value: 6.868 df: 3 p value = 0.76

Have you been taught about indications and techniques of composite repair	• Yes - 81 (77.14%) • No - 2 (1.90%) • Not aware - 0	• Yes - 17 (16.19%) • No - 4 (3.81%) • Not aware - 1(0.95%)	Pearson's Chi Square value: 12.113 df: 2 p value = 0.002
Have you replaced a defective composite restoration in your dental practice?	• Yes - 75(71.43%) • No - 8 (7.62%)	• Yes - 17(16.19%) • No - 5 (4.76%)	Pearson's ChiSquare value: 2.746 df: 1 p value = 0.097
Have you done repair of composite restoration in your dental practice	• Yes - 77 (73.33%) • No - 6 (5.71%)	• Yes - 17 (16.19%) • No - 5 (4.76)	Pearson's Chi Square value: 4.454 df: 1 p value = 0.035
Most common indications of repair	• Discolouration - 44 (41.90%) • Partial loss of composite - 31 (29.52%) • Secondary caries - 6 (5.71%) • Fracture of restoration - 2 (1.90%)	• Discolouration - 8 (7.62%) • Partial loss of composite - 6 (5.71%) • Secondary caries - 5 (4.76%) • Fracture of restoration - 3 (2.86%)	Pearson's Chi square value: 10.065 df: 3 p value = 0.018

Reason for repair rather replacement	• Cost effective - 30 (28.57%) • Least time consuming than replacement -37 (35.24%) • Increased longevity of a repaired restoration - 7 (6.67%) • Repaired restoration is consider permanent filling - 2 (1.90%) • Ask about patient preference - 7 (6.67%)	• Cost effective - 5 (4.76%) • Least time consuming than replacement - 11 (10.48%) • Increased longevity of a repaired restoration - 4 (3.81%) • Repaired restoration is consider permanent filling - 0 • Ask about patient preference - 2 (1.90%)	Pearson's Chi Square value: 3.167 df: 4 p value = 0.530
Minimal intervention treatment include repair of defective restorations	• Agree - 78 (74.29%) • Disagree - 5 (4.76%)	• Agree - 18 (17.14%) • Disagree - 4 (3.81%)	Pearson's Chi Square value: 3.280 df: 1 p value = 0.70
Restoration gives extended longevity through the use of repair procedures	• Agree- 80 (76.19%) • Disagree-3 (2.86%)	• Agree- 19 (18.10%) • Disagree- 3 (2.86%)	Pearson's Chi Square value: 3.242 df: 1 p value = 0.072
Repairing a composite defect will ———— the composite restoration	• Rough-69 (65.71%) • Smooth-11(10.48%) • Polish-3(2.86%)	• Rough-13 (12.38%) • Smooth- 7 (6.67%) • Polish- 2 (1.90%)	Pearson's Chi Square value: 5.879 df: 2 p value = 0.053
Which bur do you use on the surface of repaired restoration	• Fine-grit diamond bur-68(64.76%) • Taper fissure bur-12(11.43%) • Round bur- 3 (2.68%)	• Fine-grit diamond bur- 11(10.48%) • Taper fissure bur-6(5.71%) • Round bur-5(4.76%)	Pearson's Chi Square value: 12.360 df: 2 p value = 0.002
What sign does the	• Defective margin-	• Defective margin-	Pearson's Chi Square

management of defective composite restoration exhibit ?	73 (69.52%) ● Roughness-9(8.57%) ● Minimal intervention-1(0.95%)	13 (12.38%) ● Roughness-7(6.67%) ● Minimal intervention-2(1.90%)	value: 10.575 df: 2 p value = 0.005
What is the cause for defective composite restoration ?	Marginal leakage-65(61.90%) Recurrent caries-15(14.29%) Discoloration-2(1.90%) All of the above-1(0.95%)	Marginal leakage-10(9.52%) Recurrent caries-4(3.81%) Discoloration-2(1.90%) All of the above-6(5.71%)	Pearson's Chi Square value: 22.393 df: 3 p value = 0.000
Advantages of repair of composite restoration	● Tooth substance preservations-2 (26.67%) ● Reduced risk of harmful effects on the pulp-51(48.57%) ● Reduction intreatment time-2(1.90%) ● Reduce cost to the patient- 2(1.90%)	● Tooth substance preservations-4 (3.81%) ● Reduced risk of harmful effects on the pulp-12(11.43%) ● Reduction in treatment time-3(2.86%) ● Reduce cost to the patient- 3(2.86%)	Pearson's Chi Square value: 10.724 df: 3 p value = 0.13

Table 1: Denotes the responses obtained for various questionnaires included in the survey and their responses given by general dental practitioners and specialists regarding the management defective composite restorations.

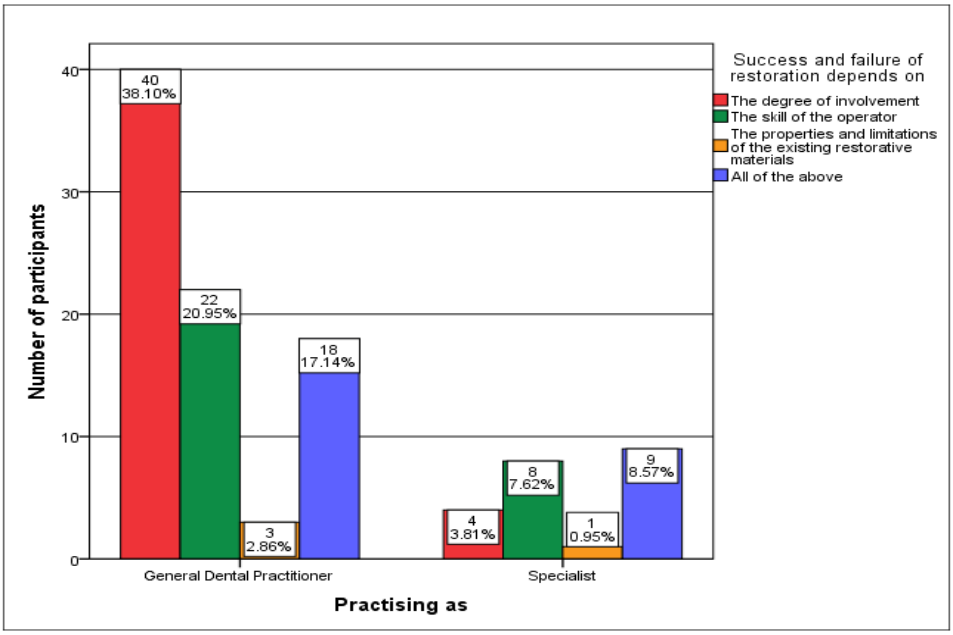

Fig.1 : Bar graph represents the association between the field of practice (general dental practitioner / specialist) and their opinion regarding success and failure of restoration, X- axis represents the field of practice and Y- axis represents number of participants. Success and failure of restoration depends on the degree of involvement (red), the skill of the operator (green), the properties and limitations of the existing restorative materials (orange) and all the above (blue). Majority of the general dental practitioners (38.10%) answered that the degree of involvement of carious lesions determines the success and failure of restorations. Chi square test was done and association was not significant (p value- 0.076; p >0.05) proving that association between the field of practice of the dentists (specialists/ general practitioners) and their response to the question was statistically not significant.

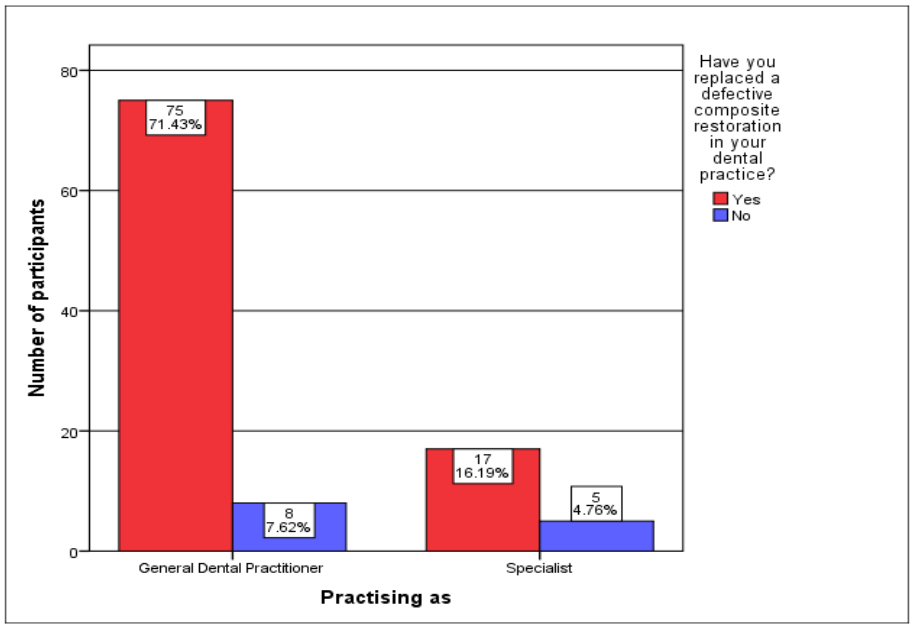

Fig.2 : Bar graph represents the association between the field of practice (general dental practitioner / specialist) and their opinion regarding replacement of defective composite restoration, X- axis represents the field of practice and Y- axis represents number of participants. 71.43% of the general dental practitioners say yes (red) that they have replaced defective composite restoration in dental practice and 7.62% of the general dental practitioners say no (blue). Chi square test was done and association was not significant (p value- 0.097; p >0.05) proving that association between the field of practice of the dentists (specialists/ general practitioners) and their response to the question was statistically not significant.

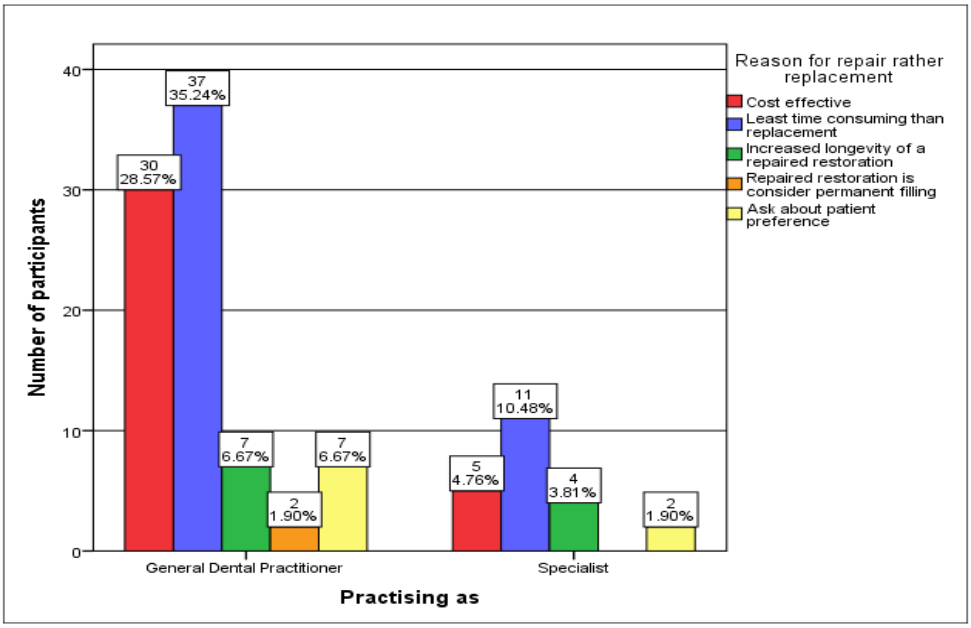

Fig.3 : Bar graph represents the association between the field of practice (general dental practitioner / specialist) and their opinion regarding reason for rather replacement, X- axis represents the field of practice and Y- axis represents number of participants. Reason for repair rather than replacement is - cost effective (red), less time consuming than replacement (blue), increased longevity of the repaired restoration (green), repaired restoration is considered permanent filling (orange) and patient preference (yellow). Majority of the general dental practitioners (35.24%) answered that repair was less time consuming than replacement. Chi square test was done and association was not significant (p value- 0.530; p >0.05) proving that association between the field of practice of the dentists (specialists/ general practitioners) and their response to the question was statistically not significant.

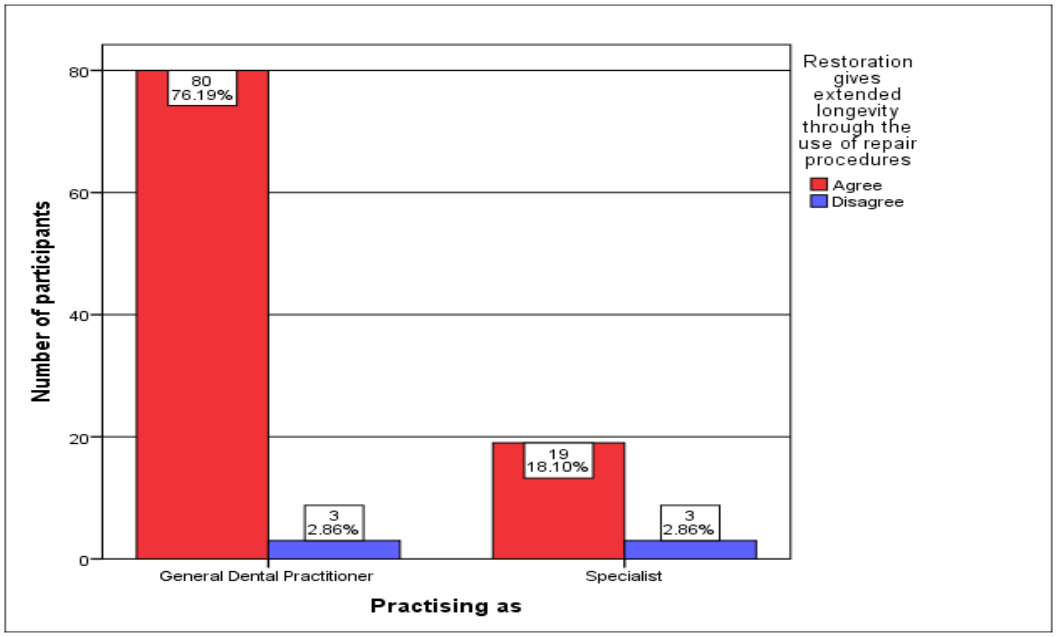

Fig.4 : Bar graph represents the association between the field of practice (general dental practitioner / specialist) and their opinion regarding longevity of the restoration following repair, X- axis represents the field of practice and Y- axis represents number of participants. Restoration gives extended longevity through the use of repair procedures is agreed (red) by 76.19% of the general dental practitioners and disagreed (blue) by 2.86% of general dental practitioners. Chi square test was done and association was not significant (p value- 0.072; p >0.05) proving that association between the field of practice of the dentists (specialists/ general practitioners) and their response to the question was statistically not significant.

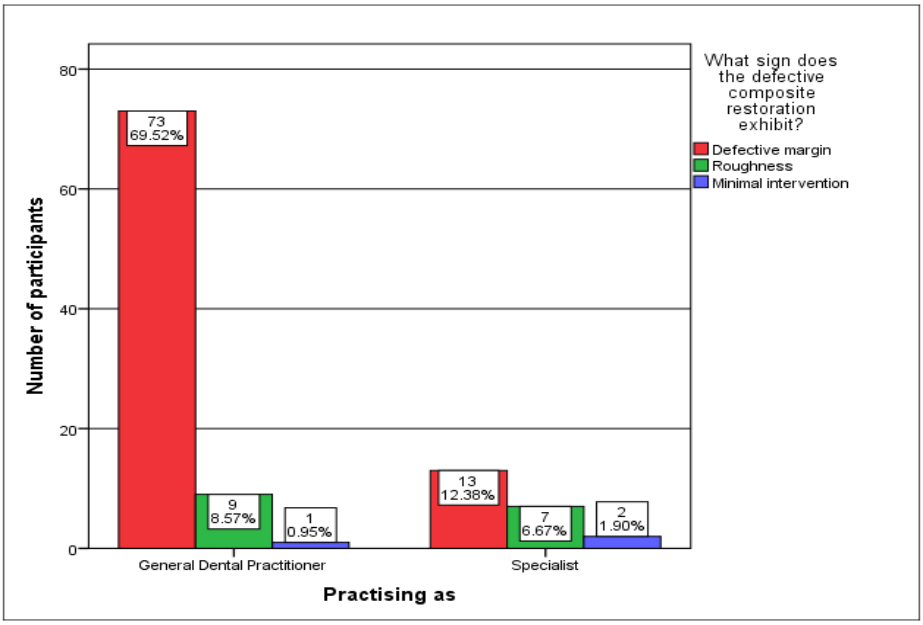

Fig.5 : Bar graph represents the association between the field of practice (general dental practitioner / specialist) and their opinion regarding management of defective composite restoration. X- axis represents the field of practice and Y- axis represents number of participants. Sign of defective composite restoration is defective margin (red), roughness (green) and minimal intervention (blue). Majority of the general dental practitioners (69.52%) answered that defective margin is the sign that defective composite restoration exhibits. Chi square test was done and association was significant (p value- 0.005; p >0.05) proving that association between the field of practice of the dentists (specialists/ general practitioners) and their response to the question was statistically significant.

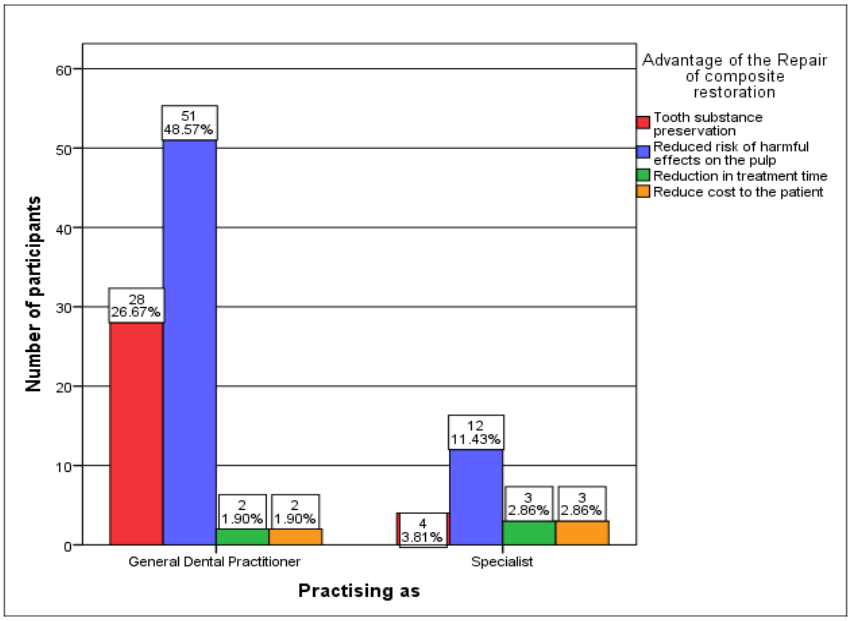

Fig.6 : Bar graph represents the association between the field of practice (general dental practitioner / specialist) and their opinion regarding sign of repair composite restoration. X- axis represents the field of practice and Y- axis represents number of participants. Advantage of the repair of composite restoration is tooth substance preservation (red), reduced risk of harmful effects on the pulp (blue), reduction in treatment time (green) and reduced cost to the patient (orange). Majority of the general dental practitioners (48.57%) answered that repair reduced risk of harmful effects on the pulp that can be caused by removing the old restoration. Chi square test was done and association was significant (p value- 0.013; >0.05) proving that association between the field of practice of the dentists (specialists/ general practitioners) and their response to the question was statistically significant.