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Gender Association Of Restorative Techniques Performed For Class 1 Cavities In University Hospital.

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Abstract: Restoration of carious teeth is of immense importance to avoid the progression of further sequelae of dental caries forming pulpits and causing periodontitis. This can be done either with direct restorative materials such as resin composites, amalgam or glass ionomer cements or with indirect restoration techniques such as with cast metals. Restorative material should be chosen bearing in mind all the factors influencing the properties of restorative material along with its advantages and disadvantages. Thus the aim of the current study is to evaluate the association of gender and material used for restoration among patients visiting university hospitals. All the cases reported between the month of June 2019 to March 2020 for class 1 dental caries were chosen for this study. Data of patients with class 1 caries and the type of restoration preferred were retrieved from the Dental records, Data of Patients who had class 1 caries were shortlisted and the type of restorative techniques used were analyzed, tabulated and was subjected to statistical analysis by running chi square test and P value was calculated to verify the significance of each of the variables used. From the statistical analysis it can be concluded that, direct restorative techniques were highly preferred for restoring class 1 cavities (99.65%). Of those, composite restorations (95.36%) were highly preferred than amalgam. With regard to the indirect restorative techniques, ceramic inlays were highly preferred by both the genders (56.3%). Within the limitations of the given study, patients with class 1 dental caries predominantly preferred tooth coloured restoration such as composites (direct restorative technique). Thus, there is no associated significance between gender and restorative techniques for restoring class 1 cavities.

Keywords: Amalgam, Class 1 caries, Composite, Inlay, Restoration.

INTRODUCTION

Dental caries, otherwise referred to as tooth decay, is one among the foremost prevalent chronic diseases of individuals worldwide.((Selwitz, Ismail and Pitts, 2007) Dental caries is defined as an irreversible and a microbial disease of the tissues of the teeth, which is marked by demineralization of the inorganic portion of the tooth and destruction of the organic substance of the tooth, which often leads to cavities. GV Black in 1908 classified dental caries into 6 classes.(Talabani, Al-Zahawi and Ibrahim, 2015) Class 1 carious lesions are those, lesions occur on the occlusal surface of molars and premolars, occlusal two third of buccal and lingual surface of molars, lingual surface of anteriors. Dental caries are generally multifactorial in etiology.((Nasim and Nandakumar, 2018) Salient feature of Restoring a tooth is to revive the function, integrity and morphology of the missing tooth Surface. Management of dental caries is often through two Important techniques- direct and indirect restorations. Direct restoration involves the utilization of Composites, amalgam and glass ionomer cement, while Indirect technique involves cast metal restorations (inlays and onlays).

Silver amalgam alloy has been used as a dental Restorative material since the start of Restorative dentistry. Reason for its wider usage lie in its ease of manipulation, relatively lower cost and long clinical survival rate as compared to other restorative material of the time.((Hsu et al., 2016) Dental amalgam fillings are stronger and long lasting, thus they are very less likely to undergo fractures.((Pereira, 2016) Several clinical studies have demonstrated that high copper amalgam can provide satisfactory performance. Amalgam fetches a 50% survival Rate of 11.5 Years. The rationale for satisfactory performance is through prevention of mechanical failure of amalgam. These Include, marginal fracture, Bulk fracture, tooth fracture. The zinc and copper content of amalgam alloy has been found to have a Strong Impact on the survival Rates of amalgam restorations since it

influences corrosion resistance of amalgam. The mean annual failure rate in posterior stress bearing cavities for amalgam restorations were only 3.0%. Yet, amalgam showed a drop down in its use due to few failures. The mode of failure was tooth fracture, bulk fracture and marginal ridge fracture.(Shenoy, 2008) Also, Incidence of true allergy to mercury had been rare (only 41 cases since 1905), yet there may be some associated oral Lichenoid - reactions with amalgam restorations.((Marshall and Marshall, 1992) Amalgam lost its popularity in major, due to its Unaesthetic nature. Thus, the preference of patients altered towards tooth coloured Restorations such as composites.

Resin composites have become the first choice for direct posterior restorations and are highly popular among patients and clinicians.(Demarco et al., 2012) Resin composites are not only more aesthetically pleasing but may also have clinical advantages over amalgam. Various studies on veneers were done that showed the importance of aesthetics among patients and dentists.(Ravinthar and Jayalakshmi, 2018) One of the major advantages of using resin composite as a restorative material is the ability of resin to bond with Enamel unlike amalgam. This Micromechanical Retention is the Strongest adhesion in the oral cavity.((Hussainy et al., 2018) Also, there is a less tooth surface loss during cavity preparations when compared to the placement of amalgam restorations where retentive forms may be required.((Chan et al., 2010) Also, Studies reveal that resin composite restored molars shows less stress than amalgam restored molars.((Arola, Galles and Sarubin, 2001) Resin composite had also been shown to have low cusp fracture rates of about 2.29%.(Wahl et al., 2004) Yet, with regard to disadvantages of resin composites, durability is a major problem with posterior composites. Polymerization shrinkage and inadequate adhesion to cavity walls, post operative sensitivity, recurrent caries and peripheral pathology are other disadvantages. Some pulpal Irritation can occur if deeper restorations are not placed over protective film.((Bowen and Marjenhoff, 1992) Also, the major issue with restorative composites is to increase their flexural strength and fracture toughness and thereby lengthen their service life in oral Cavity while still remaining with aesthetic value. However, longevity and survival studies in posterior teeth continue to show that amalgam has better track records that composites.(Bernardo et al., 2007) In posterior cavities, especially with the cervical margin situated in dentine the mass to be polymerised is so large that the shrinkage forces win out producing marginal defects and gaps despite careful application.((Brännström, Coli and Blixt, 1992) This facilitates microleakage, which can causes secondary caries, pulpal irritation, post-op sensitivity and marginal discolouration.(Kidd, 1976)

A promising method introduced to reduce the shrinkage problem was the resin composite Inlay/onlay technique.((Ferracane, 2005) Tooth surface loss is defined as the loss of tooth surface in the absence of caries or trauma.Traditionally, indirect restorations have been used as treatment of choice in such cases.((R, Rajakeerthi and Ms, 2019)) Excellent marginal adaptation and low frequency of secondary caries in patients with high caries risk is proved with indirect restorations. yet, indirect restoration techniques are more time consuming and expensive.((Robinson et al., 2008)

Thus, the selection of the type of dental Restorative material is dependent on many factors, among them are the characteristics of the tooth, patient, dentist and the material as well. Thus, dentists have to take into account all the factors that influence the success of a restorative material to restore the tooth. Studies Done on awareness of various treatment modalities among dentists also proves better awareness among dentists in selecting various modes of treatments.(21(Jose, P. and Subbaiyan, 2020) All the above discussions prompted us to conduct a study with limited resources in saveetha dental college, so as to chart out the restorative material among different genders.

Para1. 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., 2019a; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma et al., 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi et al., 2020; Samuel, Acharya and Rao, 2020)

Thus, the aim of the current study is to assess the association of class 1 caries and materials used for restoration among male and female patients.

MATERIALS AND METHODS:

This was a retrospective study conducted under a university setting. Ethical approval for the current study was obtained from the institutional ethical board (Ethical approval number: SDC/SIHEC/2020/DIASDATA/0619-0320). This study had advantages of easy access to the software, large data availability yet also had disadvantages of smaller sample size and geographic limitation. In the current study the data of patients who visited the Department of Conservative Dentistry and Endodontics from June 2019 to April 2020 were retrieved from the dental records. Sample size n = 22514. All the case sheets included in the study were approved and

verified by an external reviewer to avoid errors while recording. Also Cross- verification of data was done with photographs and direct communication with dentists. Patients of all age groups (from 2 to 83 years) and genders (both male and females) with class 1 dental caries and all those who undertook restorative treatment were included in the current study while, other patients without class 1 dental caries and patients without restorative treatments done are excluded from the current study. Patients with class 1 dental caries were diagnosed and the pros and cons of each type of restorative material were explained by their dentist and patients preference were recorded. This study has internal validity and no external validity. Data for the study was retrieved. Collected data were tabulated in the excel sheet. This data was then imported to SPSS by IBM after coding. Parametric and non- parametric correlations were done. Following which graphs were made. Non parametric tests were done by clicking onto legacy dialogue, chi square test was run and P value was determined to verify the significance of each of the variables considered and the results were interpreted and analysed statistically.

RESULTS AND DISCUSSIONS:

From the statistical analysis it is evident the direct restorative techniques were highly preferred (99.6%) over indirect restoration technique (0.35%) (Figure 1). Of those patients who preferred direct restoration techniques 55.1% were males and 44.9% were females (Figure 2). Of those patients who choose indirect restoration techniques 52% were males and 48% were females with p value greater than 0.005 showing statistical insignificance. This insignificance can be attributed to smaller sample size and unbiased data considered (Figure 2). On commenting about the direct restorative materials preferred, composites were highly preferred (95.4%) over amalgam (Figure 3). Of those who preferred composites were 55% males and 45% were females (Figure 4) and of those who preferred amalgam 55.2% were males and 44.7% were females (Figure 4). In relation to the preference of indirect restoration techniques 41.3% of them preferred class 1 metal inlay, 1.3% of patients preferred class 1 composite inlay and 56.3% of them preferred class 1 ceramic inlay. Of those who preferred class 1 inlay 51.2% of the patients were males and 47.5% of the patients were females with p value greater than 0.005 showing statistical insignificance. This insignificance can be attributed to smaller sample size and unbiased data considered. (Figure 5).

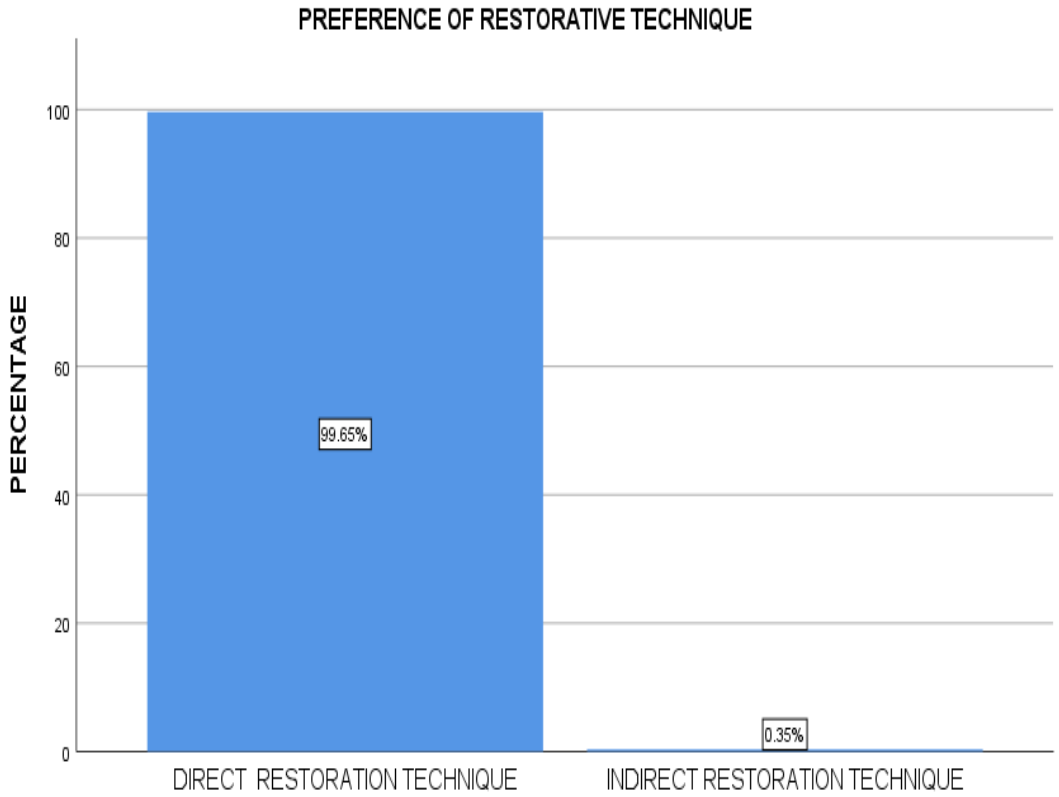

Fig.1: Bar graph showing the preference of direct and indirect restoration techniques among patients with class 1 dental caries. Blue codes for direct restorative technique(99.65%) and red codes for indirect restorative technique (0.35%). X axis represents the restorative techniques and

Y axis represents that percentage scale from 0 to 100. Direct restorative techniques were highly preferred by patients for treating class 1 dental caries.

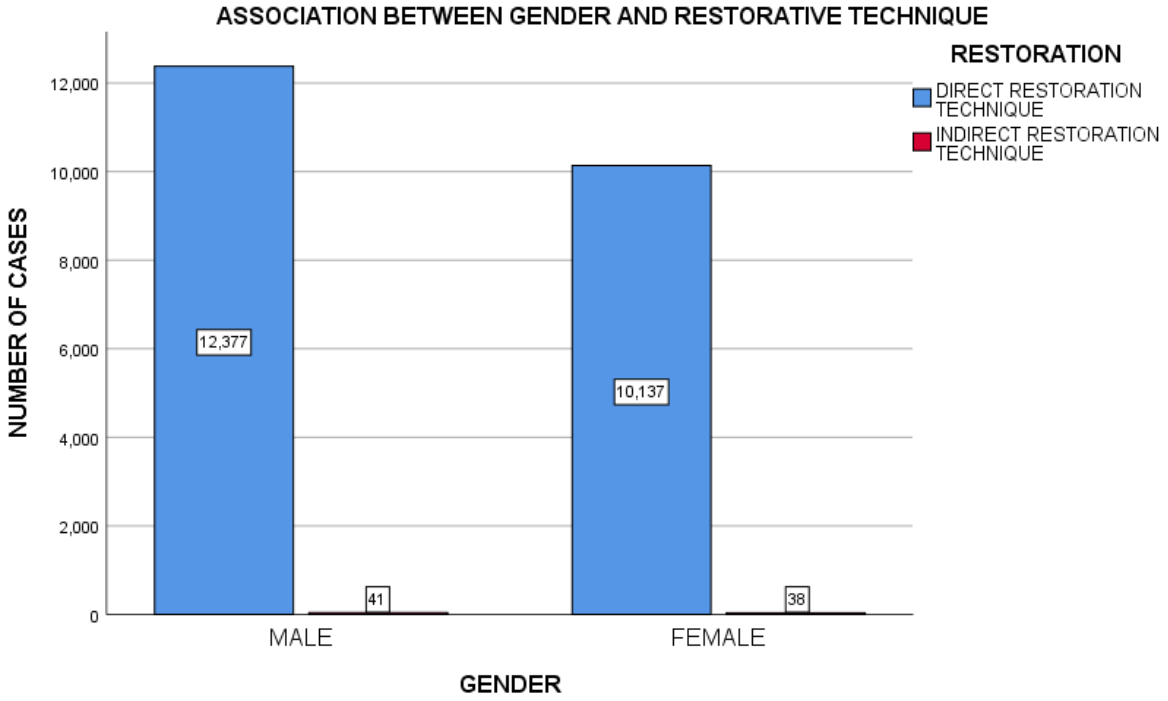

Fig.2: Bar graph showing the association of gender with preferred restorative techniques for treating class 1 dental Caries. Direct restoration technique is represented in blue and indirect restoration technique in red. The Y axis shows the scale of total number of cases from 0 to 12,000. Chi- square test was done and association was not significant. Pearson's Chi-Square value:2.19, DF:4, p=0.700 (p>0.005) hence not significant, but direct restorative techniques were preferred by Male patients than female patients for restoring class 1 dental caries.

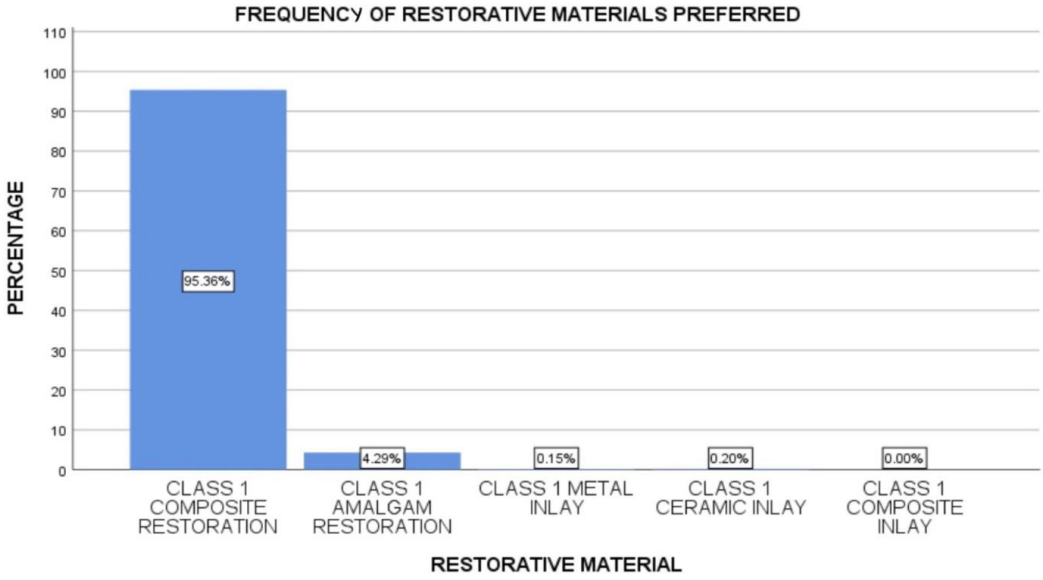

Fig.3: Bar graph showing the preference of restorative materials for restoring class 1 dental caries. Different restorative materials are repressed in blue. The X axis shows the types of restorative materials and the Y axis shows the scale of percentage from 0 to 100. Light cured Composite restorations were highly preferred over amalgam and other indirect restorative techniques (95.3%).

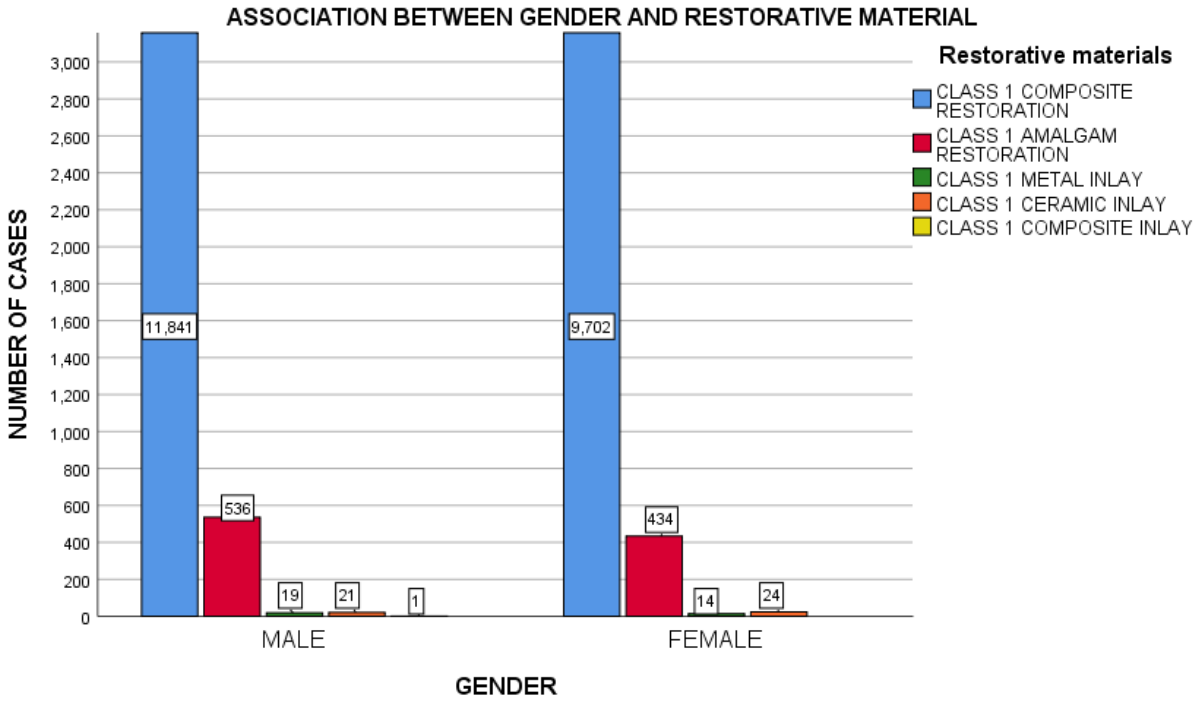

Fig.4: Bar graph showing the association of gender to preferred restorative materials for treating class 1 dental Caries. Different restorative materials are represented by various colours. The X axis marks the Gender and Y axis scale shows the number of cases from 0 to 3000. Chi- square test was done and association was not significant. Pearson's Chi-Square value:2.19; DF:4, p=0.700 (p>0.005) hence not significant. There is no noted association between the gender and type of restorative material used for restoring class 1 dental caries.

Fig.5: Bar graph showing the association of the gender to class 1 inlay restoration for treating class 1 dental Caries. Blue represents class 1 metal inlay, red represents class 1 ceramic inlay and green represents class 1 composite inlay. The X axis shows the gender of the patients and the Y axis shows the scale of total number of cases from 0 to 25. Chi-square test was done and association was not significant. Pearson's Chi-Square value:1.8, DF:2, p=0.397 (p>0.005) hence not statistically significant, but class 1 ceramic inlay restorations were preferred by female patients than Male patients for treating class 1 dental caries.

Table 1

ASSOCIATION BETWEEN GENDER AND RESTORATIVE TECHNIQUES			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.196	4	.700
Likelihood Ratio	2.566	4	.633
Linear-by-Linear Association	.064	1	.800
N of Valid Cases	22593		
ASSOCIATION BETWEEN GENDER AND INLAY RESTORATION			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.846	2	.397
Likelihood Ratio	2.233	2	.327
Linear-by-Linear Association	.364	1	.546
N of Valid Cases	79		

Table 1: Chi-square test to investigate the association between gender and different restorative materials such as composite, amalgam and inlay. It is evident from the table that gender when correlated with composite and amalgam restoration shows statistical significance. While gender when correlated with inlay shows statistical insignificance.

With regard to different restorative techniques, direct restoration was preferred by 99.6% of patients while only 0.35% of them had preferred indirect restoration, of those who preferred direct restoration 55.1% of them were males and 44.9% of them were females. While those who preferred indirect restoration 52% of them were males

and 42% of them were females. 41.3% of patients preferred Class 1 metal inlay, 56.3% preferred class 1 ceramic inlays and only 1.3% if the patients preferred class 1 composite inlay restorations. Considering the following variables such as marginal discoloration, surface texture, anatomic form, color match, and secondary caries Mendonca et al in 2010, concluded that direct restorations performed better than indirect composite inlays for marginal integrity.((‘Direct versus indirect cusp fracture restorations’, 2007) The reason could be attributed to the allowance of preservation of tooth structure by direct composite restorations.((Ericson, 2007)) Higher patients preference towards direct restorations can be due to the disadvantages of indirect restoration such as high time consuming, low levels of flexural strength and elastic modulus and higher wear levels.((Peutzfeldt, 1997)

Considering direct type of restorative materials 95.4% of patients preferred class 1 composite restoration of which 55% of them were male patients and 45% of them were female patients and 4.3% preferred amalgam of which 55.2% of them were male patients and 44.4 % of them were (Leinfelder, 1991) female patients. This is in accordance with the study done by K. Hemani in 2018, who proved that 30% of patients chose composites, 22 % of patients chose amalgam, while 48% of patients chose to leave the decisions with the dentist. Today’s increasing demand for aesthetic restorations among patients along with the crucial concerns on mercury toxicity might change patients' preference towards restorations.((Kemaloglu, Pamir and Tezel, 2016)

With the current study as a platform, better restorative material can be identified and will enable dentists and patients to gain a thorough knowledge on pros and cons of different restorative material for class 1 caries. Limitations of this study include Geographic limitations as predominantly South Indian population were only considered, and was a Unicentric study with few incomplete and unclear data. The Future scope of this study will yield a better and more accurate result when different ethnic populations are considered.

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)

CONCLUSION:

Within the limitation of the present study, direct restorative techniques were highly preferred for restoring class 1 cavities in comparison to indirect restorative techniques. Corresponding to the direct restorative techniques composites were highly preferred followed by amalgam by both the genders. Also there was no significant association between gender and restorative materials used for restoring class 1 dental caries.

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