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CONSERVATIVE CLASS 1 AMALGAM VS CONSERVATIVE CLASS 1 LCR IN MAXILLARY MOLARS

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Abstract
Background: Amalgam is a restorative material especially suitable for class 1 restorations in teeth that encounter heavy chewing forces. Composite resins are being widely used these days for restoring posterior teeth due to advances in material aspect and adhesive resin technology. **Aim:** To assess the frequency of conservative class 1 amalgam vs conservative class 1 LCR in maxillary molars. **Materials and Methods:** Data was retrieved from the dental records. Data of patients who had class 1 amalgam and class 1 LCR restoration were collected from the patient management records of the department of conservative dentistry and endodontics. Patients with class 1 restoration in maxillary molars were shortlisted. Data obtained was tabulated in excel and analysed using statistical software. **Results:** Out of 11,152 class 1 restorations performed in maxillary molars, 10,978(98.44%) were composite restoration and 174(1.56%) were amalgam restoration. **Conclusion:** According to this result, most of the restorations were done with composite compared to amalgam restoration in maxillary molars. More awareness should be created about the advantages and disadvantages of both composite and amalgam to provide appropriate suitable restoration.

Keywords: Class 1, Composite, Amalgam, Maxillary molars, Restoration, LCR.

1. Introduction:

Amalgam is a restorative material especially suitable for class 1 restorations in teeth that encounter heavy chewing forces. The advantages of amalgam restorations include excellent load bearing properties, resistance to wear, tolerance to a wide range of clinical placement conditions(1). Amalgam restorations may also be known as the most widely and successfully used posterior restorative material till today(2). Reason for its popularity lies in its ease of manipulation, relatively low cost, and long clinical service life. However amalgam restorations may also cause changes in the intraoral environment due to secondary caries, fracture, marginal breakdown and wear. It is also known to cause cytotoxicity but the risk of side effects is low(3).

Composite resins are being widely used these days for restoring posterior teeth due to advances in the material aspect and adhesive resin technology(4). Flowable composite resins improve

marginal seal and reduce microleakage. Disadvantages of composites include micro leakage, staining at the margins of the restorations, recurrent caries, post operative sensitivity and development of pulpal and periapical pathology(5). Composites have been imposed as restorative alternatives due to modern dentin adhesives and increased mechanical properties. Shortcomings of composite have been associated with stress generation on the tooth interface, as a consequence of shrinkage and tensile stress caused by occlusal loading(6).

Composite shows lower wear resistance than amalgam and not the material of choice for patients with heavy occlusion, bruxism and large occlusal coverage(7). Amalgam clearly overcomes composites when it comes to cost effectiveness. Composite was between 1.7 and 3.5 times more expensive than amalgam. The mercury toxicity of dental amalgam is still a hot topic of debate. Based on scientific evidence, the American Dental Association's (ADA) Council of Scientific Affairs declared in 1998 that amalgam can be used safely in adults and children as a restorative material(8). Except for particular contraindications such as aesthetics and pregnancy, the available research does not directly link amalgam to mercury toxicity, nor does it necessitate its termination. Allergic reactions do occur, although they are quite uncommon(9) (10). Our team has extensive knowledge and research experience that has translate into high quality publications(11–20),(21–24),(25–29) (30). The aim of this study is to assess the frequency of conservative class 1 amalgam vs conservative class 1 LCR in maxillary molars.

2. Materials and Methods:

This retrospective study was conducted as a university setting which includes predominantly South Indian population. In this study a total of data of 11152 patients of all age groups and genders visiting Saveetha Dental College and Hospitals with Class 1 caries were considered. The approval for this study was obtained from the institutional ethical committee. Data was collected from the dental records, patient management records at the department of conservative dentistry and endodontics. Inclusion criteria were the patients with class 1 restoration. Patients who did not have class 1 caries and patients who did not undergo class 1 restoration were excluded from this study.

All the cases were approved and verified by an external reviewer and cross verification was done using a photographic method to eliminate the errors made while recording. Repeated and incomplete patient data were excluded from this study. The data was obtained and tabulated in excel, imported to SPSS software by IBM, a statistical software with variables defined. Descriptive stats and Chi Square tests were done on SPSS version 23.

3. Results and Discussion:

In this study out of 11152 Class 1 restorations done in maxillary molars (n=1385), 10,978(98.44%) were composite restoration and 174(1.56%) were amalgam restoration. Out of 11152 patients, (5763)51.68% were males, (5213)46.74% were females and (2)0.02% were

transgender. The age distribution of this study was as follows; 25.03% belong to 6-20 years of age, 63% belong to 21-40 years of age, 11.40% belong to 41-60 years of age and 0.57% belong to 61-80 years of age .

Amalgam is a non-insulating material that necessitates more extensive tooth preparation and may cause heat injury to the pulp in deep cavities(31). The damage can be avoided with the use of a varnish, liner, or base. If not adequately lined, chemically cured composite resins can cause a mild to severe pulp reaction, however UV light cured or visible light cured materials are relatively safe and can be utilised in deep cavities as well(32) (33).

Amalgam is most preferred due to its moderate leakage, less incidence of recurrent decay, high resistance to wear, lower cost and require single visit, but it is not used in some cases due to its brittleness, subject to chipping, allergic response, early sensitivity to hot and cold, non esthetic(34) (35). This is in concordance with our study that amalgam is used in most of the posterior restoration and most preferable in Class 1 restorations. Even with some of their disadvantages like non esthetic, allergy etc, amalgam restoration is preferred due to its advantages. Due to aesthetic properties and good clinical service, composites have become the preferred material for direct posterior restoration(36).

When choosing restorative material, longevity is a crucial consideration. Restorations have a finite lifespan and will most likely need to be replaced at some point(37). In comparison to most other materials, tests on amalgam have shown that it has a high rate of survival(38). There was no evidence of breakdown after three years, and less than 10% of restorations had been replaced after ten years. There is evidence that dispersed phase; high copper alloy amalgams have a higher survival rate than other amalgams(39). Composites, on the other hand, are more frequently changed than amalgam. Composites have shown to be effective in the short term. If no dentine bonding agent is employed, the survival time is between 2 and 3 years(40).

Amalgam has strong compression strength but has the disadvantage of repair fracture if the cavity is large. The composite is a tooth-colored restorative material with the drawbacks of decreased strength, polymerization shrinkage, and hypersensitivity(41). Nonetheless, amalgam restoration is favoured over composite because of its significant advantages of compressive strength, cost-effectiveness, single-visit process, and lifespan with a lower incidence of secondary caries in posterior restorations(42).

The limitation of this study was that the samples from specific locations of south India only were used in this investigation. To confirm the findings of this study and raise the degree of significance, the sample size should be expanded, and the geographic coverage should at least include the majority of South India. The study's future scope is to be conducted as a multicentered study with a larger geographic constraint.

4. Conclusion:

Although there are some limitations, the most commonly used restorative material for Class 1 caries was composite compared to amalgam.

5. Acknowledgement:

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6. Conflict of Interest:

There were no conflicts of interest as declared by the authors.

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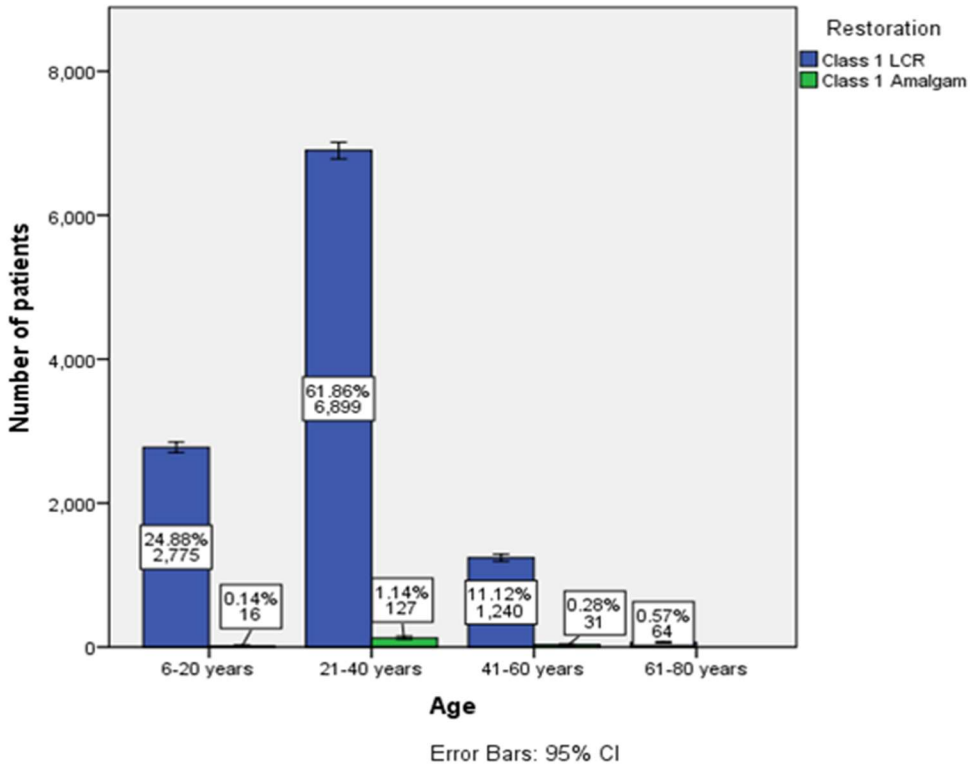

Figure 1: Bar graph showing the association of age and restoration material. The X axis represents the age and the Y axis represents the number of patients. The blue colour represents Class 1 LCR and green colour represents Class 1 amalgam. Class 1 LCR was most commonly done in 21-40 years old patients. Chi square statistical test was done and the p value was found to be 0.01(p value <0.05, statistically significant).

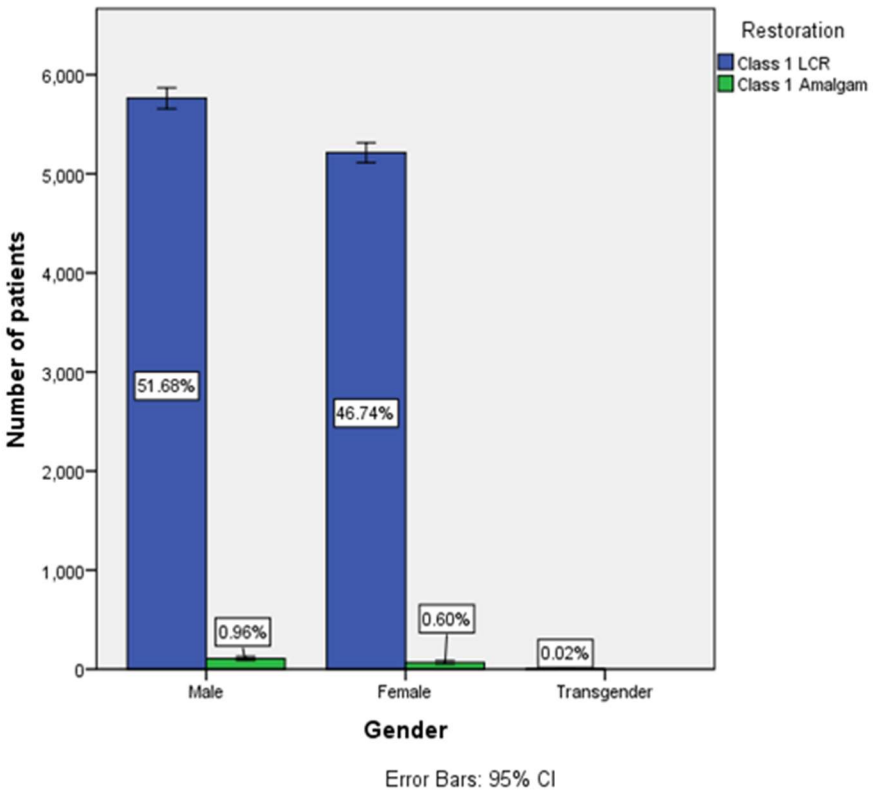

Figure 2: Bar graph showing the association of gender and restoration material. The X axis represents the gender and the Y axis represents the number of patients. The blue colour represents Class 1 LCR and green colour represents Class 1 amalgam. Class 1 LCR was most commonly done in male patients. Chi square statistical test was done and the p value was found to be 0.061(p value >0.05, statistically not significant).

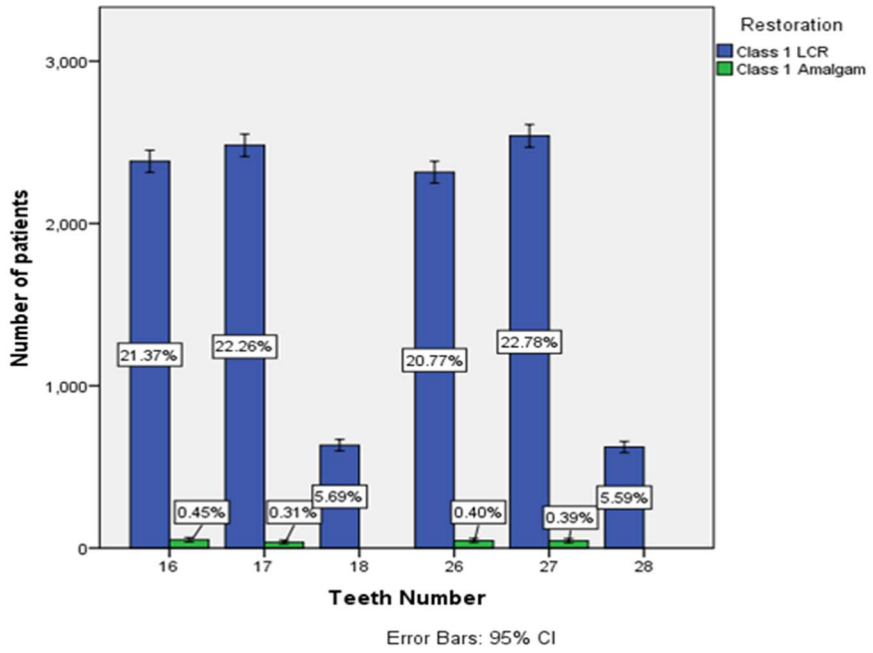

Figure 3: Bar graph showing the association of teeth number and restoration material. The X axis represents the teeth number and the Y axis represents the number of patients. The blue colour represents Class 1 LCR and green colour represents Class 1 amalgam. Class 1 LCR was most commonly done in 27(left maxillary second molar). Chi square statistical test was done and the p value was found to be 0.02(p value <0.05, statistically significant).

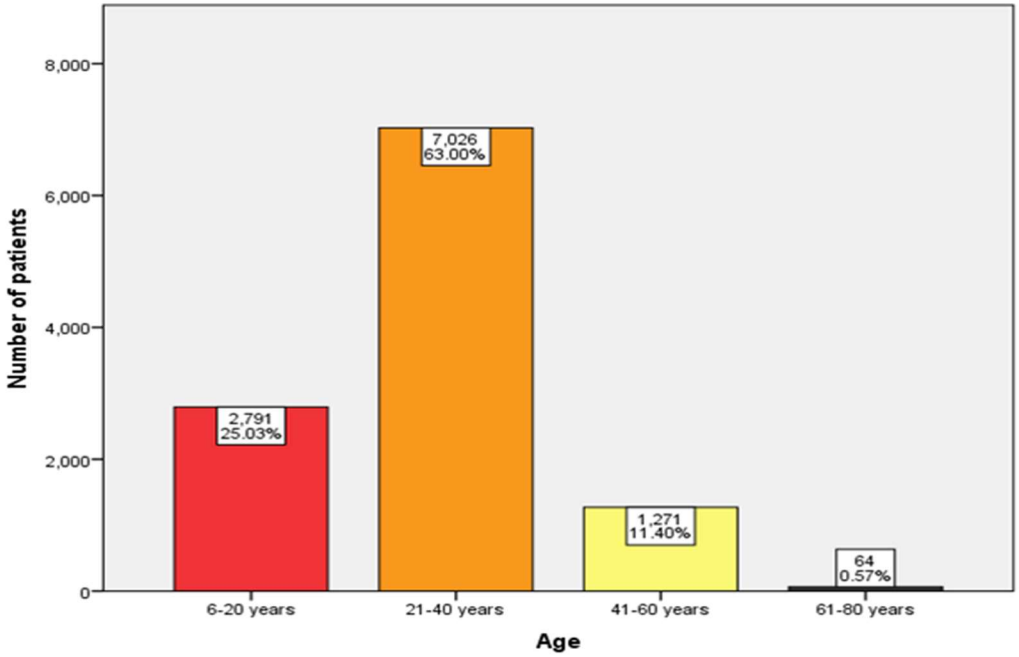

Figure 4: Bar graph showing the age distribution of this study. The X axis represents the age and the Y axis represents the number of patients. The red colour represents 6-20 years, orange colour represents 21-40 years, yellow colour represents 41-60 years of age and black colour represents 61-80 years of age. More Class 1 restorations were performed in 21-40 years of age in maxillary molars.

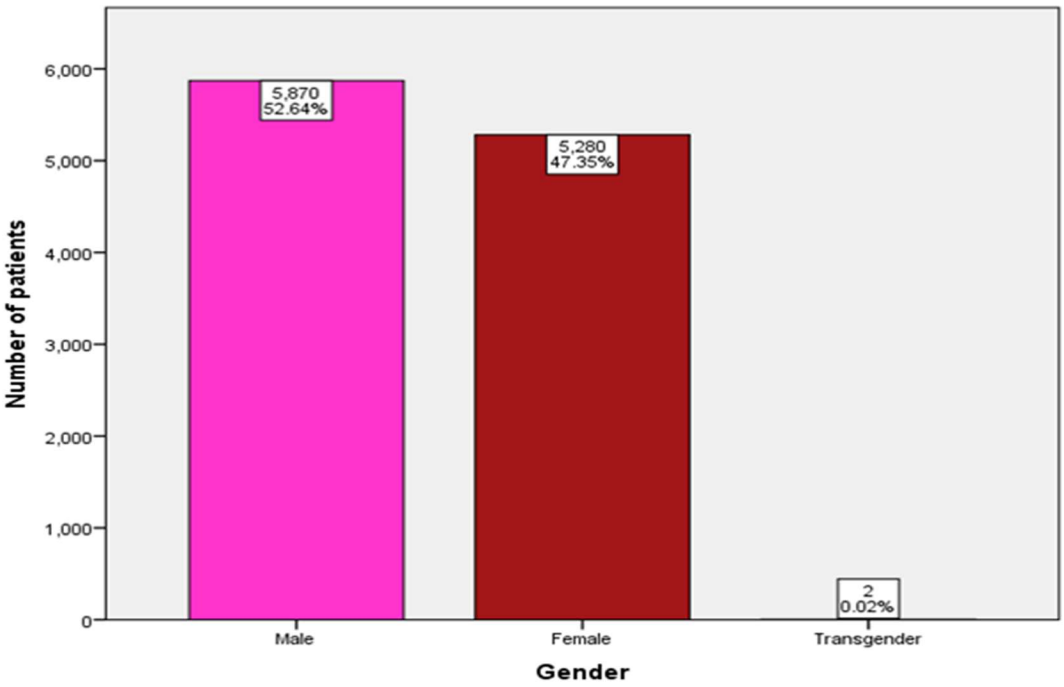

Figure 5: Bar graph showing the gender distribution of this study. The X axis represents the gender and the Y axis represents the number of patients. The pink colour represents the males, brown colour represents the females and grey colour represents the transgender. More Class 1 restorations were performed in males in maxillary molars.

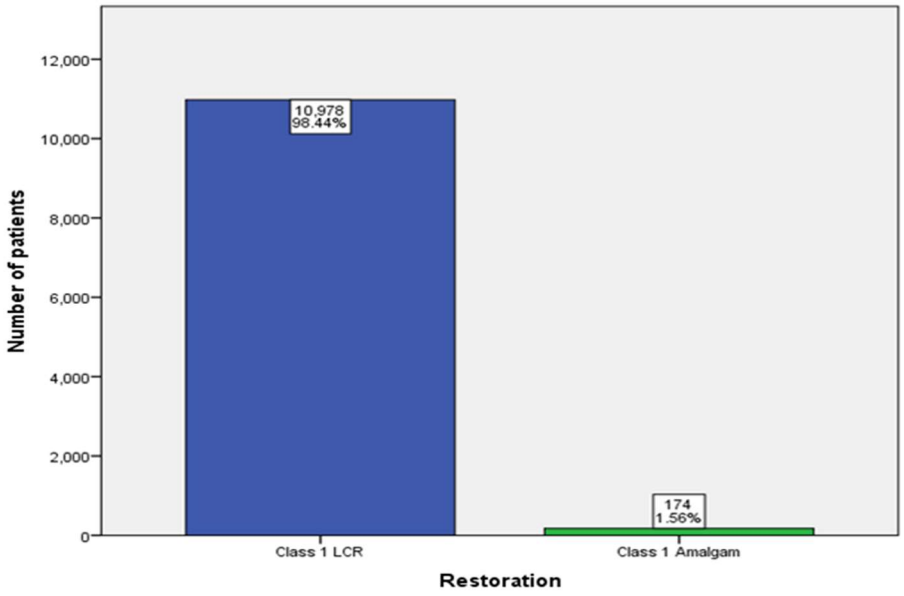

Figure 6: Bar graph showing the prevalence of Class 1 amalgam and composite restoration of this study. The X axis represents the restoration material and the Y axis represents the number

of patients. The blue colour represents Class 1 LCR and green colour represents Class 1 amalgam. More Class 1 restorations were performed with composite in maxillary molars.

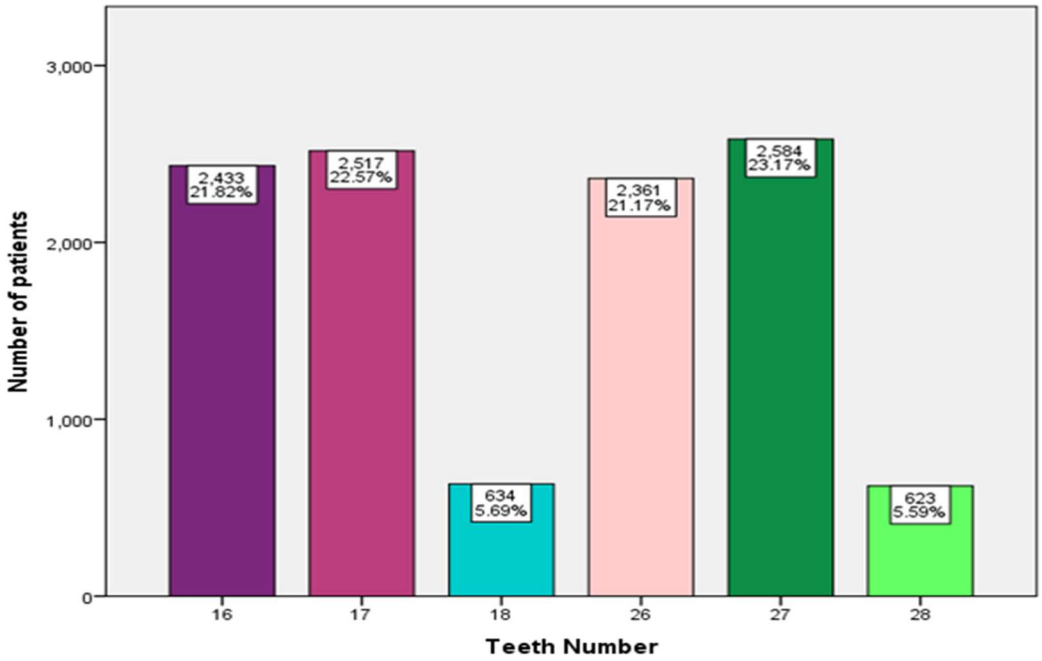

Figure 7: Bar graph showing the tooth distribution of this study. The X axis represents the teeth number and the Y axis represents the number of patients. The purple colour represents 16, magenta colour represents 17, sky blue colour represents 18, skin colour represents 26, dark green colour represents 27 and neon green colour represents 28. More Class 1 restorations were performed in 27(left maxillary second molars).