

## Prevalence and Analysis of Factors Associated with Maxillary First Premolar Class 1 Amalgam Restorations - A Retrospective Case Study

Research Article

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### Abstract

Amalgam restoration has been the main procedure amid out over the last two centuries. There are many factors that affect it from stage of filtration, packing, finishing of material but studies on the effect of gender and age on treatment are scarce. The aim is to evaluate the age and gender and amalgam restorations in maxillary 1st Premolar with class 1 cavities. Data samples required for study were taken from hospital records. All the collected data were cross verified and compiled together in an excel sheet. Compiled data were statistically analysed in SPSS software. Within the limitations of this study, males and younger patients of ages 18-39 underwent higher number of amalgam restorations in maxillary 1st premolar teeth with a p value of 0.081 (<0.05). To conclude, males and younger patients chose to do more class 1 amalgam restorations in maxillary premolars.

**Keywords:** Amalgam; Dental Caries; Premolar Teeth; Restoration.

### Introduction

Dental caries is an infectious-contagious disease that has a chronic multifactorial pattern. The presence of microorganisms on dental surfaces is essential for the development of caries disease, but only their presence is not enough [1] Factors such as hygiene, alimentary habits, bacterial colonization, time and saliva composition influence the metabolism of bacteria on teeth, leading to dental caries.

Dental caries is a disease that promotes destruction of dental hard tissues initially by the acid dissolution of the enamel mineralized matrix. If the lesion is not properly treated, it can progress through the dentin and reach the dental pulp [2] Most lesions are formed in the first mandibular molar, first maxillary molar, first maxillary premolar, first mandibular premolar, second mandibular premolar [3].

Dental amalgam is a mixture of a silver alloy with mercury and

has been in use for over 200 years. This material provides strong, durable and good cost-effective direct posterior restoration. The use of amalgam for restoration of posterior teeth is due to its tolerance to a wide range of clinical placement conditions: biocompatibility, durability, availability, and desirable mechanical properties such as good compressive and flexural strength [4].

In a study done in Nigeria a total of 2,094 restorations found to meet in the criteria with males accounting for 691(33%) and females 1403 (67%). Females also had more primary placements and replacements done for all the classes of restorations [5, 6].

There have been several studies on amalgam restorations in the past, however, very few of these studies had shown the effect of age and gender on treatment of amalgam for class 1 cavities [7].

A previous study was done on "Gender Distribution" of amalgam restorations and treatment patterns in regular attendees of a teaching hospital in Nigeria by Ajinde. The results of this study

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**Received:** September 03, 2019

**Accepted:** September 29, 2019

**Published:** September 30, 2019

**Citation:** Sindhu Priya Kuppasamy Sundara Murthy, Delphine Priscilla Antony S, Suresh V. Prevalence and Analysis of Factors Associated with Maxillary First Premolar Class 1 Amalgam Restorations - A Retrospective Case Study. *Int J Dentistry Oral Sci.* 2019;S2:02:0014:66-69. doi: <http://dx.doi.org/10.19070/2377-8075-SI02-020014>

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showed that more female patients attended and had higher number of restorations placed. There is a reduced female: male ratio for class 11 amalgam restorations [8].

Previously our team had conducted numerous clinical trials [8-11] and lab animal studies [12-19] and *in-vitro* studies [20-23] over the past 5 years. Now we are focussing on epidemiological surveys. The aim of this study is to evaluate whether there is a correlation between age and gender in patients with amalgam restorations in maxillary 1st premolar with class 1 cavities.

## Materials and Method

All the data of patients who underwent amalgam restorations in maxillary 1st premolars with class 1 cavities as study samples.

The study setting was a university setting. Exclusion criteria was case sheets with incomplete data, patients with amalgam restorations of other teeth (except 14,24), patients with other types of restorations except amalgam, those patients who did not come for follow up visits when called.

Data was collected from case sheets of patients who reported during the months of June 2019 to March 2020 from the hospital record management system where all the records of patients regarding their medical and dental history and treatment done are stored. All the data were covered by the following ethical approval number SDC/SIHEC/2020/DIASDATA/0619-0320. Cross verification was done to avoid bias by another examiner. To avoid missing any data, photographic evaluation was done.

All the relevant data were retrieved and tabulated in excel sheet.

Statistically analysed by IBM SPSS statistics version 21 was used. Dependent variables are age and gender. Independent variables tooth with amalgam filling.

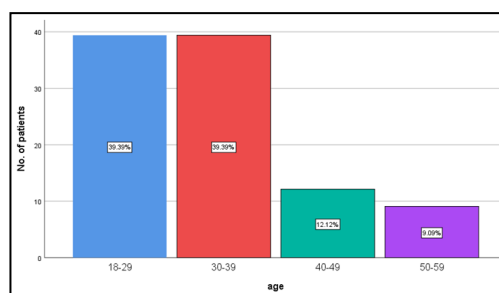
## Results and Discussion

The study consists of 33 patients, among which 14 were females, 19 were males. All the 33 underwent amalgam restorations in maxillary 1st premolars. 39.39% were from 18-29, 39.39% from 30-39, 12.12% from 40-49, and 9.09% from 50-59 age groups (Fig.1). 42.42% were females and 57.58% were males (Fig.2). 12.12% from 18-29, 9.09% from 30-39, 6.06% from 40-49 and 9.09% from 50-59 age groups underwent amalgam restorations in 14. 27.27% from 18-29, 30.30% from 30-39, 6.06% from 40-49 with a p value of 0.081 ( $<0.05$ ) (Fig.3). 18.18% of males underwent amalgam restorations in 14 and the rest 39.39% in 24. 18.18% of males underwent amalgam restorations in 14 and the rest 24.24% in 24 with a p value of 0.081 ( $<0.05$ ) (Fig.4).

In this study, the majority of the patients undergoing amalgam restorations were younger patients and males. The indication of placement or replacement of restorations or type of restoration depends on the ability and knowledge [24] of the dentist who is examining the patient. The subjectivity is an important factor, since a clinician can indicate the replacement of a restoration while others can suggest only the polishing of the same restoration [25].

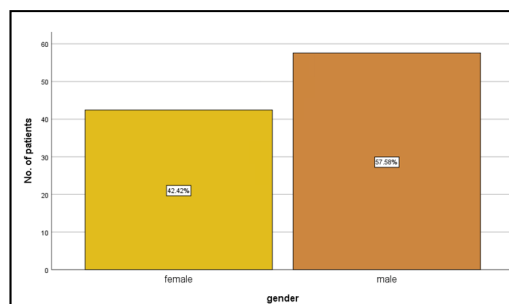
Another study by Salmara et al., showed that dental caries was the main reason that led to the placement or the replacement of direct dental restorations, indicating that caries is still a significant dental problem in the population. It is possible to believe that the

**Figure 1. Bar graph represents the percentage of patients with their age groups.**



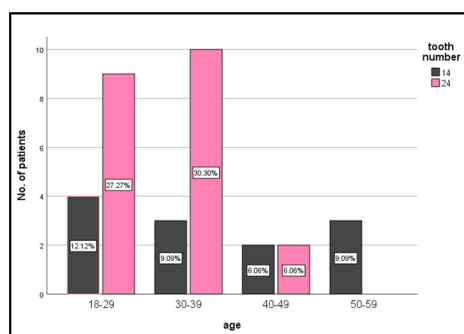
Bar graph represents the percentage of patients with their age groups. X-axis represents the age of the patients. Y-axis represents the percentage of patients. From the graph it is evident that 39.39% were from 18-29(blue), 39.39% from 30-39(red), 12.12% from 40-49(green), and 9.09% from 50-59(purple) age groups.

**Figure 2. Bar graph represents the percentage of patients with their gender.**



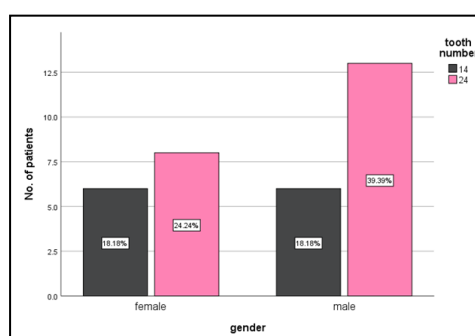
Bar graph represents the percentage of patients with their gender. X-axis represents the gender of the patients. Y-axis represents the percentage of patients. From the graph it is evident that 42.42% were females(yellow) and 57.58% were males(brown)

Figure 3. Bar graph represents the association between Age and Tooth number.



Bar graph represents the association between Age and Tooth number. X-axis represents the age of the patients. Y-axis represents the percentage of patients. Majority of the patients 30.30% had amalgam restoration in 24 (pink) in age group 30-39 and 14 (grey) in age group 18-29. Chi-square test was done and the association was found to be statistically significant. Pearson's Chi-square value: 0.452, DF:2, p value: 0.081 (<0.05) hence statistically significant, proving that the younger the patients the higher the percentage of restorations.

Figure 4. Bar graph represents the association between Gender and Tooth number.



Bar graph represents the association between Gender and Tooth number. X-axis represents the gender of the patients. Y-axis represents the percentage of patients. More males, 39.39% had amalgam restoration in 24 (pink) and 18.18% in 14 (grey). Chi-square test was done and the association was found to be statistically significant. Pearson's Chi-square value: 0.116, DF:2, p value: 0.081 (<0.05) hence statistically significant, proving that more male patients underwent amalgam restorations.

occurrence of dental caries is not limited only to the individual issues, but also to social, economic, cultural and environmental factors [26].

A study by Ajinde was done for 13 years, showed more females underwent class 1 amalgam restorations and younger patients had more amalgam restorations in posterior teeth. A recent study by Denmark, the results showed an almost equal use of amalgam and composite was used more frequently in premolars [27].

Females had 67% of restorations placed while males had 33%, indicating that females had more restorations by Tyas. The female:male ratio was 5:6. Males and females are exposed to detailed caries factors such as chewing gums and chocolates. Females tend to take time to attend to their oral health and attend clinics regularly [28].

The decision to replace an amalgam restoration for esthetics purposes was based on the desire of the patient to have a restoration similar to the colour of the tooth structure. In another study by Thomas J Hilton, younger patients considered aesthetics, so older patients received more amalgam restorations.

In this same aspect, factors related to the appearance of composite restorations, such as discoloration of the entire restorative material, margin discoloration and poor anatomic form were reasons that led to the replacement of composite restorations [29, 30].

Another reason to replace restorations can be the occurrence of secondary caries. This is closely related to the degradation of the margins of the restoration, leading to microleakage, that is the clinically detectable passage of bacteria, fluids, molecules or ions between the cavity wall and the restorative material. This may occur due to polymerization contraction stress of the composite, the use of incorrect adhesive and restorative techniques and if the dentist fills a cavity that has carious infected dentin. Secondary caries can also occur in amalgam restorations. Older patients and more posterior teeth receive an amalgam restoration have increased [25, 31].

The limitations of this study are the sample size, unicentric study and limited demographic data. This study could be further improved by increasing the sample size and check the various factors involved affecting the choice of restorations.

## Conclusion

There are various available therapeutic possibilities for a restoration of tooth, damaged by tooth diseases or trauma of any kind. One of the oldest used restorations are Amalgam restorations, and they have proved to be successful to reconstruct posterior teeth, due their acceptance of tooth-decay extension and high occlusal forces. Within the limitations, the study concludes males and younger patients chose undergo more class 1 amalgam restorations in maxillary premolars.

## Acknowledgment and Declarations

First author, Sindhupriya performed the data collection by reviewing patient details, filtering required data, analysing and interpreting statistics and contributed to manuscript writing.

Second author, Dr. Delphine contributed to conception of study title, study design, analysed the collected data, statistics and interpretation and also critically revised the manuscript.

Third author, Dr. Suresh. V participated in the study and revised the manuscript. All the three authors have discussed the results and contributed to the final manuscript.

This research was supported by Saveetha Dental College and Hospital. We thank the department of Oral Medicine, Saveetha Dental College for providing insight and expertise that greatly assisted this research.

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