



## Association of age and sex of patients undergoing class 2 amalgam restoration in mandibular premolars

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(MOD)

### ABSTRACT

The most versatile restorative materials in the field of dentistry are dental amalgam which constitutes 75% of all restorative materials used by dental practitioners. Due to its excellent load-bearing capacity and low costs, it is still the top priority for many dentists. In this retrospective study, the details of the 86,000 patient records were reviewed and analyzed, out of which 160 patients who had undergone class 2 amalgam restoration in mandibular premolars between June 2019 to March 2020 were included in this study. The details like age, gender, tooth number and the surface of restorations were evaluated and entered in SPSS, version 23. The data were analyzed through a chi-square test. It was observed that there is no significant association between age, and surface distribution in mandibular premolars ( $p > 0.05$ ), however, on analyzing the association between gender and tooth surface, the statistical significance between gender and tooth surface was found ( $p < 0.05$ ). Within the limitations, the mandibular second premolars had undergone more class 2 amalgam restoration than the first premolar. Disto occlusal restoration was performed in higher numbers, followed by mesio occlusal restoration in both genders.



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### INTRODUCTION

Class 2 restoration is defined as the restoration done in a cavity that is present on the proximal surfaces of premolars and molars (GV Black). The most versatile restorative materials in the field of dentistry are dental amalgam which constitutes 75% of all restorative materials used by dental practitioners. Due to its excellent load-bearing capacity and low costs, it is still the top priority for many dentists (Bharti *et al.*, 2010). The major advantage of amalgam restorations is resistance to fracture and wear tolerance. In Spite of the presence of other direct restorative material, silver amalgam is still claimed to be more commonly used in posterior restorations due to its ability to resist masticating

forces and obtain adequate interdental contacts in proximo occlusal cavities (Mathew *et al.*, 2006).

Whenever posterior proximal caries is present, the amalgam is the first and foremost material used for the conservative management of proximal caries. Amalgam is considered to be an excellent restorative material in producing finished and polished surface of the tooth structure and also it is evident that it has plaque resistant properties and it is indicated only in cases where adequate tooth structure is present (Gilmore and Lund, 1973). Nominal removal of sound tooth structure requires conservative cavity preparations for amalgam restorations and to maintain the strength of the tooth (Mondelli, 1998).

The fortune of class 2 amalgam restoration on the significance of the cavity design, the extent of caries on the proximal aspect. In the longitudinal clinical trials, the positive outcome of amalgam restoration is found to be equal or greater than composite resin restorations (Smales *et al.*, 1990; Mjör and Jokstad, 1993; Mair, 1998). However in cross-sectional retrospective studies, based on restorations placed generally follow, the constancy of amalgam restoration is two times as much as composite restoration (Jokstad *et al.*, 1994; Mjör, 1997; Mjör *et al.*, 2000). Placement of the base, its adequate thickness depends on the depth of the cavity. The type of base used, liner, or varnish is determined by remaining Dentin Thickness (RDT). This helps to prevent damage to dentopulpal tissue (Dawson *et al.*, 2015).

In a study by Bernardo *et al.* (2007), the composite restorations have 3.5 times higher failure rates compared to amalgam restoration due to secondary caries. Collins *et al.* (1998) reported that composite restorations fail at a rate two to three times higher than that of amalgam restorations (5,8%) after 8 years of observation. The potential benefit of using dental amalgam restoration is that they are strong and long-lasting, so they are less likely to break than some other types of filling. It is the least expensive type of filling material (Pereira, 2016). In the long run, the result of dental amalgam restoration will be good provided, if the cavity preparation and marginal seal are proper and intact. The median survival time for amalgam was reported twice when compared to composite resin (Mjör *et al.*, 2000). Patient choice, since it is of less cost, it will be an affordable choice of restoration to all categories of patients. In this study, we intend to analyze the number of persons who underwent class II amalgam restorations in mandibular premolars.

## MATERIALS AND METHODS

### Study setting

This retrospective study is done under the university setup, conducted in Saveetha Dental College. Class 2 amalgam restored patients were included for this study. Approval was obtained from the institutional committee [IEC], 2 examiners were involved in the study.

### Sample Collection

The details of the 86,000 patient records were reviewed and analyzed, out of which 160 patients who had undergone class 2 amalgam restoration in mandibular premolars between June 2019 to March 2020 were included in this study. Cross verification of data for error was done by the presence of additional reviewers and by photographic evaluation. Simple random sampling was done to minimize sampling bias. It was generalized to the South Indian population.

### Data Collection/Tabulation

The records of all the patients who underwent Class 2 amalgam restoration in mandibular premolars were collected from the initial to last in the chronological order. The data verification was done based on age and sex surfaces (MO, DO, MOD). The data was methodically entered in the excel sheet and was imported to SPSS. Incomplete or censored data were excluded from the study.

### Analysis

IBM SPSS 23 software was used for data analysis independent variables including age, gender, and dependent variable include surfaces (MO, DO, MOD). Descriptive and inferential statistics were used. Descriptive statistics include the frequency of distribution of age, sex, and surface, while inferential test includes the chi-square test.

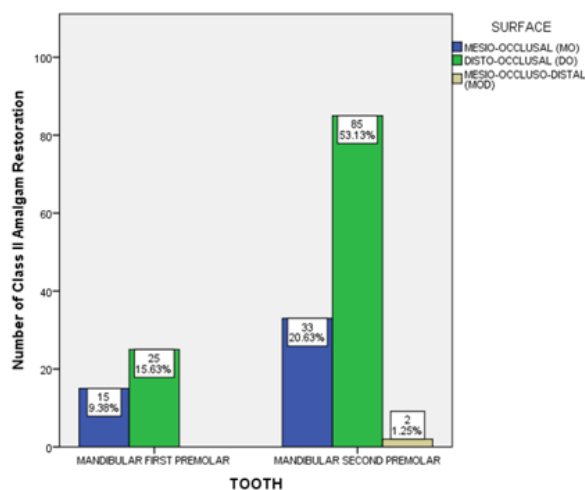
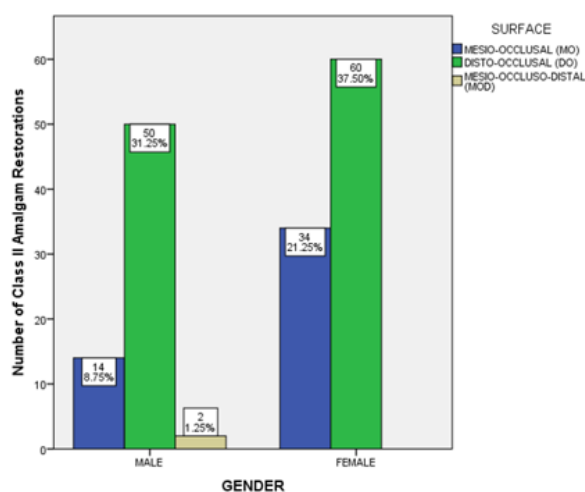
## RESULTS AND DISCUSSION

Out of 160 patients, 66 of them were males and 94 patients were females. On analyzing the age group: 18-30 yrs (21.3%), 31-40 yrs (24.4%), 41-50 years (28.7%) and age above 50 years (25.6%) underwent class II amalgam restorations in a mandibular molar, patient over the age group of 40 years had more class II amalgam restorations. 28.7% of patients who belonged to age between 41-50 years and 25.6% patients who were greater than 50 years, these groups of patients had undergone more number of class 2 amalgam restorations (Table 1).

On analyzing the surfaces of restorations involved in mandibular first and second premolars. In the

**Table 1: Distribution of Age of patients underwent Class II amalgam restoration**

Age Group	Frequency	Percentage (%)
18- 30 Years	34	21.3
31- 40 Years	39	24.4
41- 50 Years	46	28.7
> 50 Years	41	25.6
Total	160	100

**Figure 1: Bar chart shows the distribution of mandibular first and second premolars who underwent Class II amalgam restorations****Figure 2: Bar chart shows the distribution of gender of patients who underwent Class II Amalgam restoration**

mandibular first premolar, the surface of restorations found to be in MO and DO, whereas in the mandibular second premolar all three surfaces were restored namely: MO, MOD and DO. It is evident that there is no statistically significant difference seen between teeth to the surfaces restored, the p-value was 0.373 in chi-square test ( $p > 0.05$ ) (Figure 1). On observing the number of surfaces involved in males and females, males were recorded with all the three surfaces (MO, DO, MOD) and females with two surfaces (MO, DO). The relation between gender, surface cross-tabulation, we can contemplate that p-value is 0.038 and which is statistically significant as p-value is  $< 0.05$ , which is represented in (Figure 2).

In Figure 1, X-axis denotes the teeth and the Y-axis denotes the number of Class II amalgam restorations. Disto occlusal restorations (Green) were predominantly done in both the teeth when compared to Mesio occlusal restorations (Blue). However, Chi-square test p-value = .373, statistically no significant difference seen ( $p > 0.05$ )

In Figure 2, X-axis represents the gender and Y-axis represents the number of Class II amalgam restorations. Female patients had more Disto occlusal (Green) and Mesio occlusal (Blue) compared to male patients. Chi-square test p-value = .038, Statistically significant difference seen ( $p < 0.05$ ) implying female patients had more class II amalgam restorations.

In this study, we can contemplate that there is a significant association between gender and surface distribution in mandibular premolar ( $p < 0.05$ ). Also, it is observed in both age groups and gender, the disto occlusal restoration is more commonly done. The study was done by Shashank et al., where he stated that MOD cavity preparations showed the highest fracture resistance value compared to MO, DO, box cavities. Ghaderi and Mardani (2015) have stated that the clinical success rate of class 2 compomers outweighs the amalgam restoration in the first primary molars (Kavvadia, 2004).

The amalgam restorations are still in clinical practice due to its high tensile strength, its resistance to masticatory stress in posterior teeth. Studies

of [Soncini et al. \(2007\)](#) have suggested the longevity of amalgam is higher as compomers are more repeatedly replaced owing to secondary caries and composition requires seven times as many repairs as did amalgam restoration.

The various microbiological studies have revealed the growth and presence of streptococcus mutants in the margins of the composite restoration. Their existence had been attributed due to the degradation of the hybrid layer in the composite restoration over the period of time due to the polymerisation contraction leading to an increased rate of secondary caries formation in composite resin restoration compared to the amalgam restoration ([Leinfelder, 2000](#); [Ziskind et al., 2007](#)).

In an opposing note, replacement of composite restoration is frequently associated with pain and sensitivity, which is less likely observed in amalgam restoration ([Advokaat, 1990](#); [Naito, 2008](#)). Various authors have reported the survival rates of amalgam; the mean survival time is 22.5 years, while modern amalgam can be manipulated such that the restoration can stay for 12 to 15 years of durability. 78% of amalgam restorations survive over five years, 67% over ten years and 48% quite fifteen years ([Kolker et al., 2005](#); [Soares and Cavaleiro, 2010](#); [Smales and Hawthorne, 1997](#)). A 20 year old study done by Robinson has reported that the average longevity of amalgam was found to be approximately 10 years ([Hickel and Manhart, 2001](#)).

The in-vitro studies conducted at our university includes ([Ramanathan and Solete, 2015](#); [Rajendran et al., 2019](#); [Janani et al., 2020](#)), the invivo studies include ([Nasim and Nandakumar, 2018](#); [Nasim et al., 2018](#); [Siddique, 2019](#)), the molecular study ([Ramesh et al., 2018](#); [Noor and Pradeep, 2016](#)), the reviews and systematic reviews published are ([Kumar and Antony, 2018](#); [Ravinthar and Jayalakshmi, 2018](#); [Rajakeerthi and Nivedhitha, 2019](#)), the surveys conducted ([Manohar and Sharma, 2018](#); [Jose et al., 2020](#)), and the clinical trial conducted on root canal irrigants were ([Teja and Ramesh, 2019](#); [Ramamoorthi et al., 2015](#)). Currently, we are analyzing retrospective studies. In this study, we evaluated the class II amalgam restorations in mandibular premolars.

The limitations of this study include limited sample size and the time frame. The future scope of the study is to extend the data collection into a wider range of population and to analyze the frequency of amalgam restoration over other direct restorations and its survival analysis based on age and tooth surfaces.

## CONCLUSION

Within the limitations, the mandibular premolars have predominantly restored surface was found to be disto-occlusal (DO), and less frequently Mesio-Occluso-Distal (MOD) surface that had undergone class 2 amalgam restoration. The amalgam, in terms of longevity, is superior to composite resin restorations. The amalgam should always be given the first choice of preference if it does not concern esthetic appeal, especially in posterior teeth due to excellent load-bearing capacity and reduced incidence of marginal leakage and secondary caries formation.

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## Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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