

Evaluation Of Commonly Treated Maxillary Teeth With Preventive Resin Restoration Among Children With Permanent Dentition

Research Article

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Abstract

Introduction: Preventive resin restorations are a more conservative treatment mode involving the removal of the demineralised carious portion of the tooth, restoring it with composite and establishing an optimum seal of the restored surface without any sound tooth structure removed unnecessarily. Thus, the present study aims to evaluate permanent teeth in children which are treated with PRR's.

Materials and Methods: The retrospective study had 208 patients who were between 12-17 years of age and treated with PRRs. The gender, age and tooth treated were noted and tabulated. The data was statistically analysed using SPSS v26 (IBM. inc.,USA). Frequency distribution charts for the data categories were obtained and Pearson's Chi-square test was performed on the data.

Results: From the study, it was observed that a greater number of males (56.24%) than females (43.75%) were treated with PRRs for early stage caries. Fewer patients were treated for caries in the premolars (0.96% for right maxillary first premolars and 0.48% for right maxillary second premolars) compared to molars. Children aged 13 years required treatment more often (23.08%) compared to other ages while those of 12 years required treatment less often (9.13%). The left side was more prone for PRR treatment (54.81%) compared to the right side (45.19%). Males were more commonly treated in maxillary right permanent first molars compared to females which was not statistically significant ($p=0.139$).

Conclusion: Males are treated more for PRRs compared to females, while there is a greater need for treating carious teeth during the adolescent years. The study however, has to be filtered from the bias of a predominant right or left handed population to assess whether the side of the dentition requiring treatment with PRRs more often, is relevant.

Keywords: Preventive Resin Restoration; Permanent Dentition; Maxillary Teeth; Innovative Technique; Eco-Friendly Study; Children.

Introduction

As against the usual approach of preparing a cavity at the carious site and restoring it with a durable filling material like amalgam or composite, preventive resin restorations (PRR) are a more conservative treatment mode [1]. It involves the removal of the demineralised carious portion of the tooth (in which case the lesion is confined to a minimal portion of the occlusal surfaces of the teeth), restoring it with composite and establishing an optimum seal of the restored surface [2]. Thus, any sound tooth structure is not removed unnecessarily. The niche involved in the procedure

is the application of the sealant, encompassing the restored surface and any conterminous pits and fissures [3]. Thereby, the occlusal surfaces of posterior teeth including premolars and molars, in both the permanent and primary dentitions, are applicable for such kinds of restorations [4]. As recollected in previous studies [5], a common indication where PRR's can be used is where the carious lesion in a pit or a fissure is small and definite. It is only after a thorough examination that a diagnostic decision may be made regarding the administration of a PRR for the concerned patient. During diagnosis, factors including the size, site, and nature of the carious lesion is considered. Sometimes, diagnosis can

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be supplemented with radiographic investigations, or it is assessed by tactile and visual examination alone. However, there are previous studies which suggest radiographs to be inappropriate for choosing to perform a PRR for the patient, as the minute lesions are not captured properly [6]. Given the condition that there are no proximal caries, and that the caries are only superficial and have not extended deep into the hard tissues of the teeth, PRR's can be opted as a treatment mode [7].

The procedure of a PRR is simplistic and similar to that of a composite restoration, with isolation being the key to achieve a successful end result [8]. The site is illuminated sufficiently and probed to assess any 'catch', softening of the enamel, or white spot lesions [9]. Any caries, if present, are removed in a conservative manner, the site is isolated using a rubber dam or a cotton roll, the surface is etched, bonded and the composite restoration is placed [4]. Following this the sealant is applied over any contiguous pit and fissure regions susceptible to developing caries, and over the restored tooth surface [10].

The teeth that erupt, following the exfoliation of primary teeth are known as permanent teeth. As the permanent teeth erupt, from the starting of the mixed dentition phase, they can be highly susceptible to developing caries. When newly erupting, they undergo a phase of post eruptive maturation during which they can be easily influenced by any adverse conditions in the oral environment [11]. The constant presence of acidic foods and poor oral hygiene habits may compromise the mineralisation of the tooth surface, as the enamel undergoes post eruptive maturation. Thus it becomes imperative that sites showing even the slightest signs of emergence of caries, need to be addressed without any due. In this case, conventional preparations would only compromise the strength and reduce the bulk of the hard tissues unnecessarily. Besides, children require meticulous monitoring of their oral hygiene habits, given that it is harder to motivate them to follow proper hygiene regimes, and maintain their teeth in good shape [12]. Our team has extensive knowledge and research experience that has translated into high quality publications [13-25, 26-32]. The present study thus, aims to evaluate permanent teeth in children which are treated with PRR's. The study focuses on maxillary teeth in the subjects to evaluate the effectiveness of treating the patient with a PRR.

Materials and Methods

The present study is retrospective study conducted in a university setting. Among the patients visiting the OPD, 208 patients were filtered based on the inclusion criteria of children aged 12-17 years and treated with PRR in their maxillary teeth. Exclusion cri-

teria encompassed patients who were not treated with PRRs, who were outside the age limits and who had poor photographic records for reference. Data pertaining to the Gender, Age and tooth treated were collected and tabulated. Further, it was fed into the SPSS software, v26 (IBM.inc.,USA), for a descriptive statistical analysis. The frequency distribution of each of the data categories were obtained and the Chi-square tests were performed on them to correlate data categories. The results were thus analysed and inferred.

Results

Among the 208 patients considered in the study, 43.75% were female patients and 56.25% were male patients. (Figure 1) It was observed that 0.96% of teeth treated were the right maxillary first premolar (blue), 0.48% of treated teeth were right maxillary second premolars (green). 25.48% of treated teeth were right maxillary first molars (brown), 18.27% were right maxillary second molars (purple), 35.10% were left maxillary first molars (yellow) while 19.71% were left maxillary second molars (red). Hence, left maxillary first molars were most commonly treated. (Figure 2) Children aged 13 were the most commonly treated (23.06%). (Figure 3) About 54.81% of the patients were treated on the left side and 45.19% of the patients were treated for the right side. (Figure 4) Males were more commonly treated in maxillary right permanent first molars compared to females which was not statistically significant ($p=0.139$). (Figure 5) No statistical difference was found based on gender of the patient which was not statistically significant. ($p=0.235$) (Figure 6).

Discussion

Preventive resin restorations are opted for their ability to persist for a longer duration. Certain researches show they can last indefinitely [33] as against sealants and fillings which have a maximum possible lifespan of 6-8 years, provided the dentition is maintained well post treatment [34]. There is also the operative difference of the dentist requiring to remove tooth structure upto the dentin for fillings and sealants while PRRs are minimally invasive with the damaged tooth structure extending only up to the enamel. As a result, the strength of the enamel and its structural integrity is not compromised. Therefore, there is a greater preference of practitioners in performing PRRs on the patients particularly detected with caries at an early stage, more specifically International Caries Diagnosis and Assessment System (ICDAS) stages II and III [35]. The present retrospective study was conducted on patients within 12-17 years, to assess the prevalence of preventive resin restorations in children with caries on their maxillary denti-

Figure 1. Bar chart represents gender distribution of patients treated with PRRs. The chart shows a male predominance with 43.75% female patients (denoted by red) and 56.25% male patients, (denoted by white).

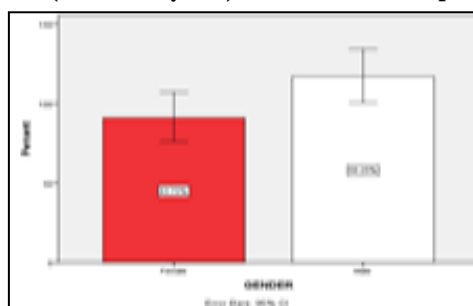


Figure 2. Bar chart shows frequency distribution of teeth treated in the maxillary arch. The graph represents the percentage of patients treated for each tooth with PRRs. It is observed that 0.96% of teeth treated were the right maxillary first premolar (blue), 0.48% of treated teeth were right maxillary second premolars (green). 25.48% of treated teeth were right maxillary first molars (brown), 18.27% were right maxillary second molars (purple), 35.10% were left maxillary first molars (yellow) while 19.71% were left maxillary second molars (red). Hence, left maxillary first molars were most commonly treated.

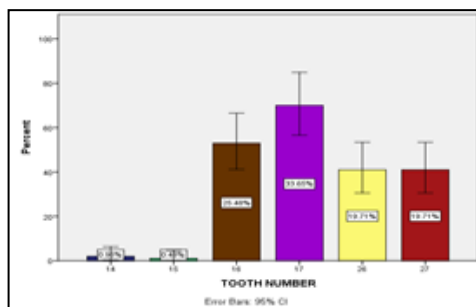


Figure 3. Bar chart shows age distribution of patients treated with PRR. Among the patients, 9.13% were 12 years of age (indigo), 23.06% were 13 years (green), 11.06% were of 14 years (grey), 18.27% were 15 years of age (violet), 17.31% patients were aged 16 (light blue), 21.15% patients were aged 17 (orange). Hence, children aged 13 were most commonly treated.

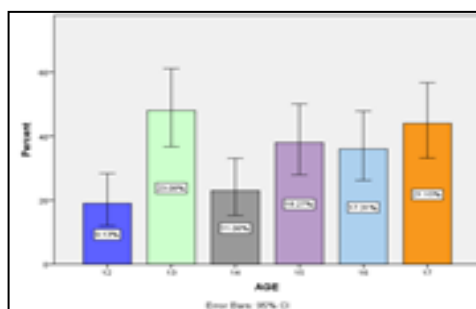


Figure 4. Bar chart shows distribution of patients based on side of maxillary arch treated, 54.81% of the patients were treated for the left side (dark green), 45.19% of the patients were treated for the right side (purple). Hence, patients were more commonly treated on the left side.

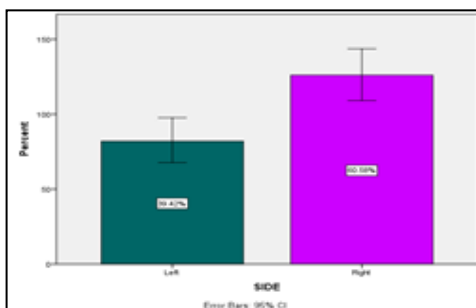


Figure 5. Bar graph shows gender wise distribution of patients correlated with their teeth treated. The x-axis represents gender while the y-axis represents percentage of treated teeth. The figure shows among male patients, 0.96% were treated on their right maxillary first premolar (blue), 0.48% were treated on the right maxillary second premolars (green), 13.46% were treated on right maxillary first molars (brown), 12.02% were treated on right maxillary second molars (purple), 18.75% were treated on the left maxillary first molars (yellow), and 10.58% were treated on left maxillary second molars (red). Among the female patients, 12.02% were treated on the right maxillary first molars (brown), 6.25% patients were treated on right maxillary second molars (purple), 16.35% were treated on the left maxillary first molars (yellow), and 9.13% were treated on left maxillary second molars (red). Males were more commonly treated in maxillary right permanent first molars compared to females which was not statistically significant (p=0.139).

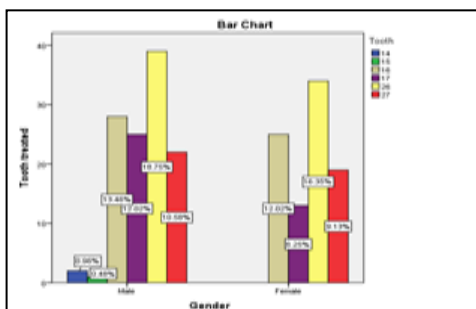
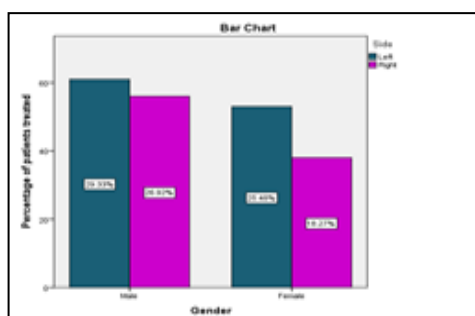


Figure 6. Gender distribution of patients correlated with the side of maxillary arch treated. Among the male patients, 29.33% were treated on the left side (dark green), 26.9% were treated on the right side (purple). Among the female patients, 25.48% were treated on the left side (dark green) and 18.27% were treated on the right side (purple). No statistical difference was found based on gender of the patient which was not statistically significant. ($p=0.235$)



tion. The study attempted to identify any gender predilection on treatment with PRRs. Further, the predominant side of treatment was also assessed.

Based on a previous study by Demirci et al, maxillary teeth were observed to be more prone to developing caries and requiring prophylactic treatment, compared to mandibular teeth [36]. On this basis, the present study was conducted on maxillary teeth alone, for patients who were treated with PRRs. As observed from figure 1, there is a greater number of males (56.24%) than females (43.75%) treated with PRRs for early stage caries. This is coherent with a study by Al Sadhan *et al.*, [37], who reported more males between 12-14 years of age to be developing caries to a greater extent, compared to females. However, other previous studies [38] indicate a higher risk of caries for females over males of the same age group, due to either hormonal imbalances at the onset of puberty or due to the habit of frequent snacking in between meals.

As observed in figure 2, there are fewer patients treated for caries in the premolars with 0.96% right maxillary first premolars and 0.48% right maxillary second premolars, compared to molars. This could be due to the ease of accessibility of premolars, as they are ahead of the molars in the dentition. This finding is similar to a study by Baginska *et al.*, [39] who substantiated the finding with lapses in meticulous cleaning of posterior teeth by children. Further, among the molars, the left maxillary first molars required treatment more often (35.10%), compared to the right first molars (25.48%).

It is observed from figure 3, that children aged 13 years required treatment more often (23.08%) compared to other ages while those of 12 years required treatment less often (9.13%). This could be, again, due to the onset of puberty from 13 years of age leading to hormonal imbalances associated with weakening of the tooth structure [40].

In figure 4, it is observed that the left side was more prone to undergo PRR treatment (54.81%) compared to the right side (45.19%). A previous study [41] indicated that carious lesions were more inclined to occur on the right side, for left-handed people and left side, for right-handed people, due to their inclination to brush better on the side in lieu with the hand they use predominantly. This finding could indicate a bias in the study population with more patients being right-handed, showing a better hygiene status on the right dentition compared to the left.

It may be inferred from figure 5 that among the males, premolars also required treatment which was not observed in the females. Yet, between both genders, the left maxillary first molars required treatment more often than other teeth (18.75% for males, 16.35% for females). The p value however is insignificant at 0.502 ($p<0.05$), which could be due to the small sample size included in the study. Figure 6 shows that in both males and females, the left side required treatment more often than the right side (29.33% for males, 25.48% for females). Again for this observation, the p value is insignificant at 0.380 ($p<0.05$), perhaps requiring better substantiating with a bigger study population.

Thus the present study attempted to correlate treatment with PRRs and their gender and age predominance. The study also assessed which teeth among the maxillary posteriors were more susceptible to caries, thus requiring PRR, among males and females.

Conclusion

In conclusion, it can be stated that males are treated more for PRRs compared to females, while there is a greater need for treating carious teeth during the adolescent years. The study however, has to be filtered from the bias of a predominant right or left handed population to assess whether the side of the dentition requiring treatment with PRRs more often, is relevant. This study thus aimed to provide evidence to practitioners on what they may expect to see among their younger patients, and may enable them to take diagnostic decisions, thereby imparting adequate treatment.

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