

Prevalence and Association of Children Requiring Stainless Steel Crown in Maxillary First Permanent Molars

Research Article

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Abstract

Stainless steel crown also known as preformed metal crowns are utilized for providing full coverage to young permanent teeth and extensively used restorative material in permanent teeth. The present study aims to find the prevalence and association of children requiring stainless steel crowns in maxillary first permanent molar. A retrospective study was done by collecting required datas in University hospital between June 2019-March 2020. Datas on age, gender and tooth requiring stainless steel crown in maxillary first permanent molar were obtained after reviewing 5,000 case sheets. Descriptive statistics and chi-square test was done using SPSS statistical analyser 20.0. The prevalence rate of children requiring stainless steel crowns in maxillary permanent first molars was 1.02% (n=51). The prevalence of children requiring stainless steel crown in maxillary permanent first molar was less. There is no statistical significance association between requirement of stainless steel crown requirement with age (p=0.638) and gender (p=0.921) in children. Within the limitations of the study, there is no statistically significant association between gender, age and stainless steel crown requirement in children.

Keywords: Children; Permanent Molar; Prevalence; Stainless Steel Crown.

Introduction

First permanent molars are multi-cuspid teeth erupting in the oral cavity at around 6 years of age, forming the key to permanent dentition having increased susceptibility to dental caries [42, 48]. First permanent molars have an influence on masticatory function, occlusal height and vertical dimension maintenance, serving powerful aid for young age in planning proper health care systems [13, 19]. Permanent molars have higher susceptibility to occlusal caries than proximal caries in adolescents due to large pulp chambers and proximity of pulp horns to cusp tips having increased patency to dentinal tubules. Besides caries prevalence, permanent molars and incisors are more susceptible to hypomineralisation and hypoplastic which breaks down first permanent molar at a younger age leading to challenges in treatment [46, 16, 15, 12, 55, 49].

Stainless steel crowns were the choice of final provisional resto-

ration as they were pre-formed, pre trimmed and pre contoured crown with a wide range of sizes and with proven clinical efficiency which can be adapted to individual teeth [26, 46]. Stainless steel crowns were first introduced by "Rocky Mountain" company and later modified by various manufacturers. Stainless steel crowns are used to restore multi surface caries, fractured tooth, post endodontic restoration in both primary and young permanent dentition [15, 40, 22, 27, 33], restoration of developmental problems, abutment for space maintainers and preventive restoration in disabled children [14]. Stainless steel crowns have the advantage of convenience, low cost, durability and longevity to protect the tooth surface. The disadvantage of stainless steel crown is unaesthetic appearance due to metallic look, known nickel allergy or sensitivity and periodontal problem [45]. Stainless steel crowns have been reported to have superior longevity when compared to other conventional restorations. Adult stainless steel crowns are used as interim restoration on young permanent teeth, until permanent restoration can be placed thus providing optimal time

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for replacement [8, 18, 29]. Previously our team has a rich experience in working on various research projects across multiple disciplines [20-55]. Now the growing trend in this area motivated us to pursue this project.

Hence the present study aims to find the prevalence and association of children requiring stainless steel crowns in permanent first maxillary molar.

Materials and Methods

A retrospective cross sectional study was conducted in an University hospital .The study was employed by reviewing and analyzing case records of 5,000 paediatric patients visiting the University hospital between June 2019 to March 2020. A total of 51 subjects (24 males and 27 females) below the age of 15 years who required and underwent treatment for placement of stainless steel crown in maxillary first permanent molar were selected as study participants. The study protocol was approved by the Institute Review Board under ethical approval number SDC/SIHEC/2020/DI-ASDATA/0619-0320. Cross verification of datas was done from available clinical photographs.

Data on patients' age, gender and prevalence of tooth requiring stainless steel crown was collected and tabulated in Microsoft Excel. Incomplete or missing datas were not considered for the analysis. The age of the patients in the case records was categorized for the convenience of statistical analysis such as 5-10 years, 11-15 years. The maxillary first permanent molar requiring crown was categorized into right, left side designated by tooth number by FDI system as 16, 26 respectively. The obtained datas were imported to SPSS statistical analysis of version 20.0. Descriptive statistics and chi- square tests were done for the obtained data. A p-value or less than 0.05 was considered to be statistically significant.

Results & Discussion

From the total of 5000 case sheets reviewed, 51 subjects (24 males and 27 females) required stainless steel crown in maxillary first

permanent molar .The prevalence rate of children with stainless steel crown requirement in maxillary first permanent molar was 1.02%. Figure 1 shows the age distribution of children requiring stainless steel crown in maxillary first permanent molar. 15.7% of subjects were between the age group of 5-10 years and 84.3% were between 10-15 years .Figure 2 shows the gender distribution of children requiring stainless steel crown. Based on gender distribution 47% were males and 53% were females who required stainless steel crowns in maxillary first permanent molar. Figure 3 shows age distribution based on teeth requiring stainless steel crown, of the total population 54.9% had stainless steel crown in the right permanent maxillary first molar (tooth number 16) while 45.1% had stainless steel crown in left permanent maxillary first molar (tooth number 26) .Chi-square test shows there is no statistical significance for association between age and stainless steel crown requirement in permanent maxillary first molar $p= 0.638$. Figure 4 shows distribution of gender based on prevalence of stainless steel crown, about 53% of females had higher prevalence of stainless steel crown requirement than males 47% .Chi-square test for association of gender and prevalence of stainless steel crown shows that there is no statistically significant association between gender and stainless steel crown requirement $p=0.921$. The present study has yielded results on prevalence and association of stainless steel crown requirement in children based on age and gender.

The present study findings show that females are more prevalent and require stainless steel crowns than males, but there was no statistical significance. Similar findings , Page et al analysis on attitude of children for stainless steel crown on primary molar found no statistical significance for gender [31] . Madi et al, found females having pulpally involved caries in permanent teeth more than males [1]. These findings suggest the females have earlier eruption of tooth than males due to early onset of growth spurt and have more liability to complain to get treatment for their tooth [50].

Present study findings show that children between the age group of 10-15 years have a higher incidence of stainless steel crown than lower age group. Szymaczh found higher caries prevalence

Figure 1. Bar graph showing age distribution of the children. X axis represents the age group 5-10 years (red) ,11-15 years (pink) and Y axis represents the total number of children requiring stainless steel crown in maxillary first permanent molar .Frequency of stainless steel crown requirement is more prevalent in the age group of 11-15 years.

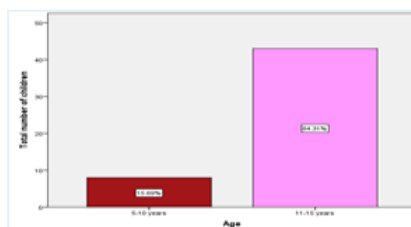


Figure 2. Bar graph shows distribution of gender in children requiring stainless steel crown in maxillary first permanent molar. X-axis represents the gender distribution females (red), males (orange) and Y axis represents the total number of children requiring stainless steel crown. Prevalence of stainless steel crown requirement is more among females.

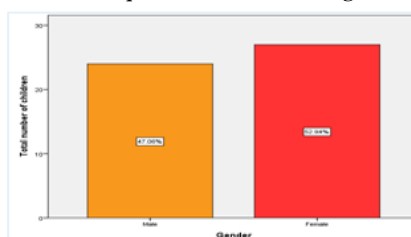


Figure 3. Bar graph showing association between age and stainless steel crown requirement in maxillary first permanent molar. X axis represents the age of the children and Y axis represents the children requiring stainless steel crown in maxillary first permanent molar. Higher prevalence of stainless steel crown requirement in 16 (violet) than 26 (yellow) in the age group of 11-15 years. The association between age and teeth requiring stainless steel crown was found to be statistically insignificant p value of 0.638, $p > 0.05$ (Chi square test).

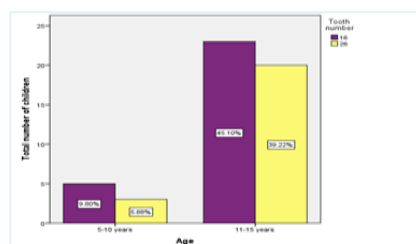
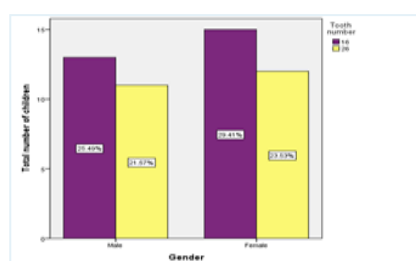


Figure 4. Bar graph showing association of gender and stainless steel crown requirement in maxillary first permanent molar. X axis represents gender of the children and Y axis represents the children requiring stainless steel crown in maxillary first permanent molar. Higher prevalence of stainless steel crown requirement in 16 (violet) than 26 (yellow) among females. The association between gender and teeth requiring stainless steel crown was found to be statistically insignificant p value of 0.921, $p > 0.05$ (Chi square test).



with enamel hypoplasia in children of 6-8 years of age [28]. Dicepolo et al, children of 12 years or older groups have increased risk of failure of stainless steel crown due to changes in occlusion and found younger groups to be more successful and benefited [7].

It has been reported that overhanging margins with poor adaptation of stainless steel crown in primary tooth may lead to impaction of permanent first molar [6]. Stainless steel crown as interim restoration has been found to perform satisfactorily in young adults in severely compromised teeth [7]. Stainless steel crown however is recognised for its cost-effectiveness, efficiency in terms of durability and longevity in the majority of the cases.

However potential limitations may have an impact on the outcome of the results such as limited sample size, geographic location and limited data variables for comparison. Further research to be done on a large scale to find the prevalence of stainless steel crown requirement in young permanent tooth. There should be increased awareness on maintenance of oral hygiene and regular dental checkups among parents and caregivers such that early interventions on caries control by fluoridation and sealants will prevent progression of caries in children. Long term follow up to be done for tooth treated with interim restoration so as to improve the prognosis. Our institution is passionate about high quality evidence based research and has excelled in various fields [20-55]. We hope this study adds to this rich legacy.

Conclusion

Within the limitations of the study, there is no statistically significant association between gender, age and stainless steel crown requirement in children. The prevalence rate of children requiring stainless steel crown in maxillary permanent molars was significantly less. Early interventions and preventive measures of treatment should be promoted to prevent future complications.

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