



Prevalence of usage of stainless steel crown, strip crown and zirconia in anterior teeth for paediatric dental patients in different age groups

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ABSTRACT

Aesthetic treatment for primary teeth has been considered as the greatest challenge in paediatric dentistry today. While there is a considerable amount of literature available on the subjective influences of aesthetic in adults, little is known about esthetics in children. The knowledge of the children's aesthetic perception is relevant to pediatric dentists because children are conscious of their dental aesthetic appearance and that of the other children. The aim of this study was to assess the prevalence of usage of Stainless steel crowns, strip crowns and zirconia crowns in paediatric dental patients in different age groups. The study was conducted in a university setting. The most common type of crown used for the treatment of anterior teeth was found to be the strip crown (100 %). Based on gender, about 60.3% of males underwent treatment for strip crowns, whereas 39.62% of females underwent treatment for strip crowns. Among the strip crowns, 27.76% of the primary upper maxillary right central incisors, 20.86% primary maxillary right lateral incisors, 29.65% primary maxillary left central incisors, 21.77% primary maxillary left lateral incisors underwent treatment for strip crowns. 28.93% belong to the year of 4 years who underwent treatment for strip crowns. The p-value obtained after running the chi-square analysis for the correlation of the gender of patients treated and the tooth number was statistically insignificant ($p = 0.803$).



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INTRODUCTION

The term "early childhood caries" was coined at a workshop in 1994 that was sponsored by the Centers for Disease Control and Prevention in an attempt to focus attention on the multiple factors (i.e. socioeconomic, behavioral, and psycho-social) that contribute to caries at such early ages, rather than ascribing sole causation to inappropriate feeding methods (Schroth *et al.*, 2007). Early childhood caries is defined as "the presence of one or more decayed (non-cavitated or cavitated lesions), missing teeth (due to caries), or filled tooth surfaces in any primary tooth in a child 72 of months age or younger. In children below three years of age,

any sign of smooth-surface caries is indicative of severe early childhood caries. From ages 3-5, one or more cavitated, missing teeth (due to caries), or filled smooth surfaces in primary maxillary anterior teeth, or decayed, missing, or filled score of ≥ 4 (age 3), ≥ 5 (age 4), or ≥ 6 (age 5) surfaces constitutes severe early childhood caries (Suzuki, 2008). Another issue causing problems in the anterior region is the abnormal frenal attachment in children, Thick labial frenum makes cleaning in that area difficult causing plaque accumulation which in turn may lead to caries in primary teeth (Christabel, 2015). Primary teeth play an important role in the confidence of preschool children and also plays a pivotal role in speech development, esthetics, and function. The maintenance of the primary dentition is important to guide the eruption of permanent teeth (Ravikumar et al., 2017). Radiographs are vital in the determining the extent of the lesion, in children generally intraoral periapical radiographs are used, advanced radiographic modalities include Magnetic Resonance Imaging, Computed Tomography and Cone-beam computed tomography, these imaging techniques are useful in knowing the depth of the lesion (Packiri, 2017), Aesthetic treatment for primary teeth has been considered as the greatest challenges in paediatric dentistry today. While there is a considerable amount of literature available on the influences of aesthetics in adults little is known about esthetics in children (Kapur, 2005; Roberts et al., 2001). The knowledge about children's aesthetic need is required by the pediatric dentists because children are very conscious about their appearance and that of the other children (Tremblay, 2011). Dental caries is an oral health problem which is found the world over with distinctive variations in its distribution. It continues to be the most common infectious disease in children. It is a multifactorial disease with *Streptococcus mutans* being the major contributor in the development of dental caries (Govindaraju, 2017; Subramanyam, 2018).

The stainless steel crowns are often the first choice for the repair of defects in primary dentition caused by caries, and have been one of the most effective and efficient methods of tooth restoration in pediatric dentistry (Georgieva et al., 2016) Stainless steel crowns placement is simple and economical with a high success rate for protecting remaining teeth weakened by excessive preparation (Randall, 2002; Maclean, 2007). However, stainless steel crowns are disadvantaged by a non-aesthetic appearance (Zimmerman, 2009). These crowns are indicated following restorative treatment or pulpectomy procedures. A pulpectomy is chosen as the treatment of

choice for primary teeth with pulp involvement and is considered to be a challenging procedure (Jeevanandan, 2017; Govindaraju et al., 2017b). Pulpectomy in primary teeth was performed using hand files, which is considered to be a time-consuming process. With the introduction of rotary instruments, the procedural time has reduced which has increased the cooperation of the children (Govindaraju et al., 2017c; Jeevanandan and Govindaraju, 2018).

The most esthetic restorative option for carious primary incisors is the bonded strip crown (Mcevoy, 1984; Webber, 1979; Croll, 1990). The disadvantage with strip crowns is they have poorer retention than stainless steel crowns and are susceptible to wear, degradation, and colour change (Ahamed, 2012). The next considered option was the Zirconia crowns (Govindaraju et al., 2017a; Panchal et al., 2019). They have an appealing appearance but require a greater reduction of tooth structure. Prevalence Studies on these crowns are limited.

The need for this type of research is to fulfil the gap present between the clinical practitioners and the researchers. It helps formulate better and more efficient methods of treatment specified to a particular population and their needs. The aim of this study is to assess the prevalence of age of stainless steel crowns, strip crowns and zirconia crowns in paediatric dental patients in different age groups.

MATERIALS AND METHODS

The most common type of crown used for the treatment of anterior teeth was found to be the strip crown (100 %). The study was conducted in a university setting. The advantage of conducting this study in a university was the easy access to large amounts of data. Ethical approval was obtained from the institutional ethical committee (ethical approval number: SDC/SIHEC/2020/DIASDATA/0619-0320). The number of people involved in the study included two researches and the data and results were reviewed by two reviewers. The data collected was carried out during the period between July 2019 to March 2020. A total of 120 patient records were reviewed and data were analysed. To minimise sampling bias, simple random sampling was done. The final sample size taken for the study was 107 patients treated for full tooth coverage of anterior teeth in the primary dentition. Maximum internal and external validity was present. The data that was collected was tabulated in excel. Duplicate values were removed and the data was segregated and graphs were produced. The data were analysed

using SPSS software.

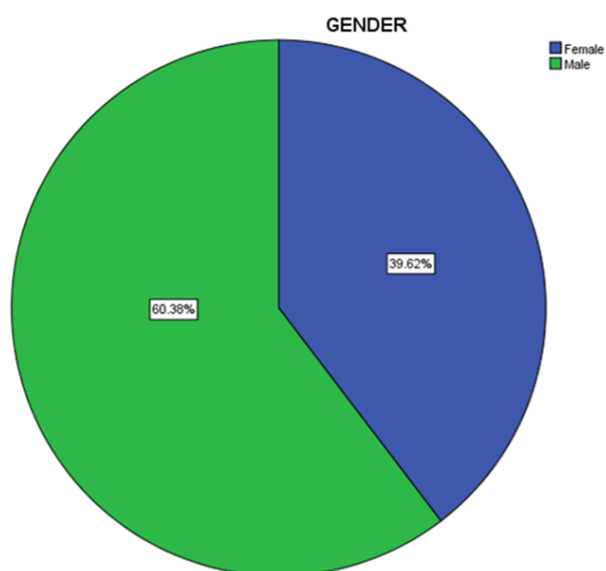


Figure 1: Piechart depicting the distribution of patients with anterior strip crown restoration based on gender. Strip crowns were more commonly given to male patients.

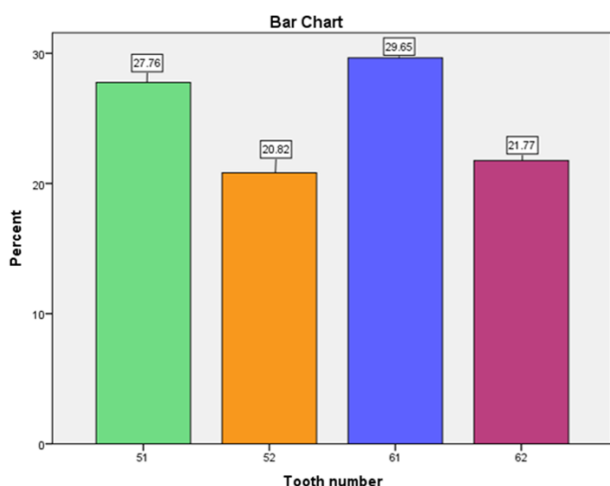


Figure 2: Barchart depicting the distribution of strip crowns for anterior teeth based on tooth number. Strip crowns were more commonly given for the primary maxillary central incisors.

RESULTS AND DISCUSSION

The most common type of crown used for the treatment of anterior teeth was found to be the strip crown (100 %). Based on gender, about 60.3% of males underwent treatment for strip crowns, whereas 39.62% of females underwent treatment for strip crowns (Figure 1). Among the strip crowns, 27.76% of the primary upper maxillary right central incisors, 20.86% primary maxillary right lateral incisors, 29.65% primary maxillary left cen-

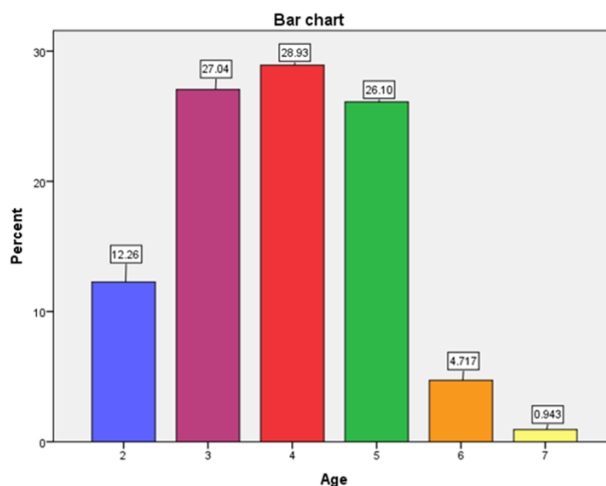


Figure 3: Bargraph depicting the distribution of patients with anterior strip crown restoration based on age. Strip crowns were more commonly given for patients who were four years of age.

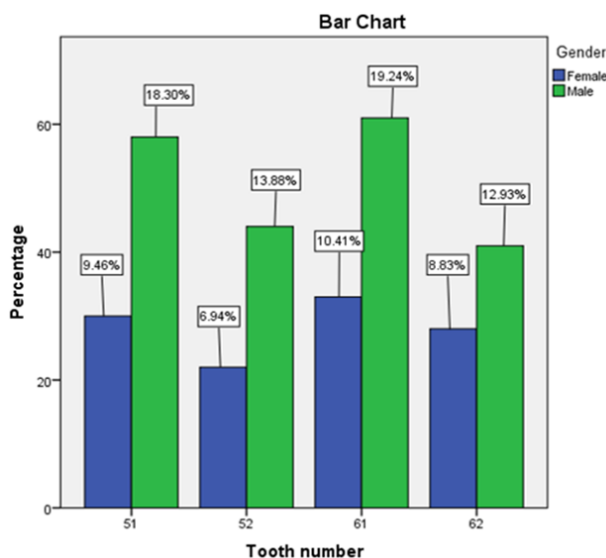


Figure 4: Bargraph depicting the correlation of gender of patients treated and the tooth number.

tral incisors, 21.77% primary maxillary left lateral incisors underwent treatment for strip crowns (Figure 2). 12.26% of patients belong to the age of 2 years, 27.04% of the patients belong to the year of 3 years, 28.93% belong to the year of 4 years, 26.10% belong to the age group of 5 years and 4.7% belong to the age group of 6 years who underwent treatment for strip crowns and 0.943% belong to the age group of 7 years who underwent treatment (Figure 3). The p-value obtained after running the chi-square analysis for the correlation of the gender of patients treated and the tooth number was statistically insignificant ($p = 0.803$) (Figure 4).

Despite the decline in the prevalence of dental caries

in children in western countries, caries in pre-school children remains a problem in both developed and developing countries. Early childhood caries has been considered to be at epidemic proportions in developing countries (Vadiakas, 2008). The prevalence of early childhood caries is estimated to range from 1 to 12% in infants from developed countries (Burt and Eklund, 2005), The etiology of early childhood caries is multifactorial and has been well established. Early childhood caries is frequently associated with a poor diet (Davies, 1998) and bad oral health (Berkowitz, 2003) habits. Failure to identify and prevent dental disease has consequential and costly long-term adverse effects as the treatment of early childhood caries is displayed the child's condition begins to decline and becomes more difficult to treat, the cost of treatment also increases. If left untreated, the worst possible outcome will be to extract the teeth to obtain relief from pain (Casamassimo, 2009) more resistant to demineralisation. Community water fluoridation began as early as 1945 and is considered as an effective way of preventing caries in children as well as adults (Somasundaram, 2015; Ramakrishnan and Shukri, 2018).

A variety of restorative options using full coverage are available for anterior primary teeth such as stainless steel crowns, polycarbonate crowns, veneered stainless steel crowns, bonded resin strip crowns, and recently introduced zirconia crowns. In this study, we assess the prevalence of 3 types of restorative material polycarbonate strip crowns, the stainless steel crowns and the zirconia crowns. The following details can be summarized from the results obtained, the most common type of crown used for the treatment of anterior teeth was found to be the strip crowns, the most prevalent teeth to receive the strip crown was found to be primary maxillary left central incisors, the most prevalent age to receive the strip crown was patients belonging to 4 years of age. The most prevalent gender to receive the strip crown was males. Oral health plays a very important role in the general well-being of individuals (Gurunathan and Shanmugaavel, 2016).

In this study, it was also noted that the most prevalent gender noted for the treatment of anterior strip crown was males and the age group most affected by early childhood caries also belong to the age group of 4 years. Similar studies have been recorded with similar results (Anil and Anand, 2017; Ramos-Gomez, 2003). The reason for the male prevalence would be the fact that they consume a high cariogenic diet and maintain poor oral hygiene owing to more prevalence of caries requiring full crown restoration. It was also noted that the most com-

monly used type of crown for the treatment of anterior teeth was found to strip crowns (100%), similar findings have been recorded in previous studies (Halawany, 2017), the possible reason could be the high aesthetic outcome from this type of treatment satisfying the patient and the parent. Contradicting results were also obtained in previous literature (Lakshmanan et al., 2020). It was also noted after running the chi-square test to analyse the correlation between the gender of the patient treated and the tooth number was statistically insignificant.

The strength of the study was The limitation of the study conducted included the Reduced sample size, Unequal distribution of cases and the Follow-up results were not possible to obtain. The future scope of this study will include a large sample size present, including different ethnicities to obtain better results, and also long term assessment of treatment to be recorded.

CONCLUSION

Within the limitations of the present study, the most prevalent type of crown used in the anterior restoration of primary teeth is strip crown strip crowns with a male gender predilection among the children among four years of age. Esthetics is of primary concern even in younger children. Controlled dietary and oral hygiene practices can prevent dental caries in primary anterior teeth.

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Conflict Of Interest

The authors declare that there are no conflicts of interest for this study.

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