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Original Research

Evaluation of stainless-steel crown size selection prediction by digital radiographic primary molar measurements

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ABSTRACT:

Background: The present study was conducted for evaluating stainless steel crown size selection prediction by digital radiographic primary molar measurements. **Materials & methods:** A total of 40 children within the age group of 4 years to 10 years were enrolled. Separate models using each, along with covariates of primary first versus primary second molars, maxillary versus mandibular molars, and their interaction, were developed using linear regression analysis, treating the final crown size as a continuous response. All the results were recorded and analysed using SPSS software. **Results:** After evaluating the final models utilizing stainless steel crown sizes of previously crowned teeth, it was observed that predictors and all covariates were significant These models were used to create size fitting guides. **Conclusion:** The crown fitting guide has favorable clinical potentialin selecting crown sizes.

Key words: Stainless, Steel, Crown, Primary molar

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INTRODUCTION

Primary teeth play an important role in growth and development of children. Attempts to maintain the primary teeth until the eruption of their permanent successors have resulted in the introduction of many restorative materials and techniques. Use of stainless-steel crowns (SSCs) is one of these techniques. Humphrey was the first to introduce prefabricated SSCs to pediatric dentistry in 1950.Since then, SSCs have been increasingly used for severely damaged primary teeth. Different SSCs in terms of size, shape and contour (festooned) have been introduced to the dental market by different manufacturers.[1- 3]

In pediatric dentistry, metals and alloys are used to make space maintainers, SSCs and brackets. Despite of increasing daily use of SSCs, there is little information about their corrosion and release of metals, especially nickel and chromium. The electrochemical corrosion phenomenon occurs in the oral cavity, resulting in degradation of the alloy as a result of enzyme activity, microbes, heat and chewing. Additionally, in such environment, corrosion causes release of metals.[4- 6]Hence; the present study was conducted for evaluating stainless steel crown size selection prediction by digital radiographic primary molar measurements

MATERIALS & METHODS

The present study was conducted for evaluating stainless steel crown size selection prediction by digital radiographic primary molar measurements. A total of 40 children within the age group of 4 years to 10 years were enrolled. Only those subjects were enrolled which received rehabilitation. Bitewing radiographs were used to obtain two linear radiographic measurements (coronal and cervical). Separate models using each, along with covariates of primary first versus primary second molars, maxillary versus mandibular molars, and their interaction, were developed using linear regression analysis, treating the final crown size as a continuous response. All the results were recorded and analysed using SPSS software.

RESULTS

A total of 40 children within the age group of 4 years to 10 years were enrolled. Only those subjects were enrolled which received rehabilitation. After

evaluating the final models utilizing stainless steel crown sizes of previously crowned teeth, it was observed that predictors and all covariates were significant These models were used to create size fitting guides.

Table 1: Correlation of stainless-steel crown size with primary molar measurements

Variable	OR	95% CI
Correlation of stainless-steel crown size with primary molar measurements	1.125	1.054 to 1.238
p- value	0.000 (Significant)	

DISCUSSION

Dental caries is a highly prevalent disease, especially among young children. The care of decayed primary teeth is crucial due to their role in chewing, speaking, and functioning as natural space maintainers in the dental arch. The treatment of dental caries in the pediatric population is a long-standing issue that involves various challenges, like behavior management and the need for a perdurable treatment that lasts until tooth exfoliation. Stainless steel crowns are the most commonly used restorative option for repairing and preserving the remaining tissue of severely damaged and decayed teeth. They were introduced into pediatric dentistry in 1947, first described by Engel, and then popularised by Humphrey in 1950. Stainless steel crowns have outperformed other materials, such as amalgam and composite, in terms of durability and longevity for more than a half-century. In fact, no restorative material has provided the benefits of low cost, reliability, and durability when interim full-coronal coverage is required.[6- 8]Tooth size in humans is determined by polygenic genetic factors. The environmental influences include particularly the socio-economic conditions, ethnicity, nutrition, childhood health and maternal aspects such as gestational conditions and systemic factors. Data regarding tooth dimensions are available in abundance in the literature. However, there is little information available about the primary dentition in Indian population.[8- 10]

A total of 40 children within the age group of 4 years to 10 years were enrolled. Only those subjects were enrolled which received rehabilitation. After evaluating the final models utilizing stainless steel crown sizes of previously crowned teeth, it was observed that predictors and all covariates were significant These models were used to create size fitting guides. Helder C et al evaluated whether preoperative radiographic measurements could predict the final steel crown selection size for restoration of primary molars. Bitewing radiographs were used to obtain two linear radiographic measurements (coronal and cervical) using DEXIS™ Imaging Software (KaVo Dental). Separate models using each, along with covariates of primary first versus primary second molars, maxillary versus mandibular molars, and their interaction, were developed using linear regression analysis (N equals 225), treating the final crown size as a continuous response. Final models utilizing stainless steel crown sizes of previously crowned teeth showed that predictors and all covariates were significant ($P<0.001$). Three cross-validation models (80 percent training sets) for each radiographic measurement showed strong agreement with the final models. Based on the final coronal model, a practitioner would achieve a correct fit using one, two, or three attempts with accuracy rates of 46 percent, 47 percent, and seven percent, respectively, with a cumulative rate through two attempts of 93 percent; for the cervical model, respective accuracy rates were 38 percent, 51 percent, 11 percent, and 89 percent. These models were used to create size fitting guides. This crown fitting guide has favorable clinical potential to assist providers, especially novice dentists, in selecting crown sizes, showing promise for expanded radiographic application in dentistry, specifically to education, technical efficiency, and minimization of waste.[11]

Aly GMM et al assessed the wear of primary teeth against three types of crown coverage, both quantitavely and qualitatively. Specimens of 30 extracted primary molars, were mounted against 10 specimens of zirconia crowns (group A), 10 specimens of preveneered stainless steel crowns (group B), and 10 extracted primary molars and 10 specimens of stainless steel crowns (group C) and were undergone in vitro wear testing using an abrasive machine. The greatest wear was recorded in zirconium specimens, and the lowest was in preveneered stainless steel crowns with a significant difference noted between the three groups ($p<0.001$). The micro-morphological wear characteristics revealed the most aggressive wear with complete loss of enamel structure in zirconium specimens. The zirconium crowns induced the most severe wear in primary molars, followed by stainless steel crowns, and the least wear was induced by preveneered stainless steel crowns.[12]

CONCLUSION

The crown fitting guide has favorable clinical potentialin selecting crown sizes.

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