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PREFORMED COMPOSITE RESIN CROWNS VS STAINLESS STEEL CROWNS IN PRIMARY DENTITION - IN VITRO STUDY

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ABSTRACT

This work evaluates the mechanical behavior of preformed composite resin crowns and verifies its clinical purpose on primary molars in comparison with stainless steel crowns. Artificial representative anatomical models of primary molars fully rehabilitated with composite resin and stainless steel crowns were constructed. Through a comparative analysis between the Experimental Technique and the Numerical Method was intended to validate the analysis model, and then to characterize the mechanical behavior of the crowns when implementing real requests.

Keywords: pediatric dentistry, preformed crowns, biomechanics.

INTRODUCTION

Performing aesthetic posterior restorations has become an increasingly important issue in Pediatric Dentistry (Zimmerman, 2009).

According to the American Academy of Pediatric Dentistry (AAPD), temporary molars presenting extensive caries or enamel and/or dentin defects affecting multiple tooth surfaces must be restored with stainless steel crowns (AAPD, 2012). However, these crowns due to poor aesthetic appearance are not the restoration of choice for pediatric patients and their parents (Zimmerman, 2009), and these ones showing high preference for tooth-colored materials as composite resins (Hutcheson, 2012).

Artificial representative anatomical models of primary molars fully rehabilitated with preformed composite resin crowns and stainless steel crowns were constructed, Figures 1 and 2. These were subjected to experimental tests for characterization of their mechanical behavior, Figures 3, 4 and 5. Through a comparative analysis between the Electronic Speckle Pattern Interferometry (ESPI) and the Finite Element Method (FEM) was intended to validate the analysis model, and then to characterize the mechanical behavior of the crowns when implementing real requests.

RESULTS AND CONCLUSIONS

There was a close fit between the experimental and numerical model, so a simulation of real conditions for both crowns was performed. It was possible to access deformation, elastic strain and (von-Mises) stress verified separately for each crown.
Despite limitations of this *in vitro* study, it was observed that preformed composite resin crowns have a similar mechanical behavior when compared to stainless steel crowns. However, their clinical selection should be carefully and always taking into account their limitations.

Preformed composite resin crowns may represent an alternative and adequate therapeutic solution for the rehabilitation of primary molars, since that can be conveniently preformed and adjusted for primary dentition.

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**REFERENCES**

