



# COMPARATIVE EVALUATION OF MARGINAL LEAKAGE OF STAINLESS-STEEL CROWNS AND FIGARO CROWNS IN PRIMARY TEETH - AN IN- VITRO STUDY

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**Abstract: Background and Aim:** Figaro crowns being a promising option for aesthetic crowns in primary teeth, a lot of its properties are still unexplored. There are no studies in the literature evaluating the marginal leakage of Figaro crowns. Hence, the aim of the present in-vitro study was to comparatively evaluate the marginal leakage of Figaro crowns in primary molars.

**Methods:** 40 primary teeth were cemented with either SSCs or Figaro crowns using Type 1 GIC. The specimens were placed in Dulbecco's Phosphate Buffered Saline solution at 37 degrees Celsius for 1 day and were then thermocycled between five degrees Celsius and 55 degrees Celsius for 6,000 cycles. The specimens were then stained with 2% basic fuchsin, sectioned, and viewed under microscope. The microleakage was assessed on a four-point scale. Data were statistically analyzed using chi-square test, ( $P < .05$ ). **Results:** Marginal leakage was noticed in all the specimens irrespective of the crowns used, however there was no statistically significant difference between SSCs and Figaro crowns. ( $p = 0.62$ ). **Conclusion:** Figaro crowns can be considered as a promising replacement to SSCs as the degree of marginal-leakage shown by Figaro crowns are similar to that of Stainless-steel crowns.

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## INTRODUCTION

Aesthetic Full coverage restoration of carious primary teeth is an evolving and demanding field of interest in pediatric dental practice. The quality, cost, technique of placement of the aesthetic crowns serves to be challenging for a paediatric dentist. Though SSCs have outperformed the other restorative materials in terms of cost, durability and longevity for decades, its metallic appearance makes it anaesthetic and scores less likes from the children and their parents. (1,2,3) With increase in demand for aesthetic crowns, use of Zirco-

nia crowns for primary teeth started evolving. Though a systematic review published in 2020 stated that Zirconia crowns are better in terms of gingival, periodontal health, aesthetics and fractures, its high cost, technique sensitivity, low grade abrasion of the opposing natural dentition are the factors that cannot be neglected.(4,5,6,7) Also, it takes more time for crown preparation, selection and insertion, which is very essential to be re-considered when dealing with children. (8)

This led to further search of new, ready made, durable and less technique sensitive crowns for use in paediatric dental practice. One such reliable aesthetic replacement is the fibreglass crowns - Figaro crowns, introduced in 2018.(9) The manufacturers claim that for placement of these crowns, minimal tooth reduction is needed similar to that of SSCs and due to flex fit technology it provides a tight marginal fit.(10) Intact, tight marginal fit is an essential criteria to be considered to determine the success of the crowns. Hence, this in-vitro study was conducted to determine and compare the micro leakage of the Figaro crowns with the gold standard SSCs in primary teeth.

## MATERIALS AND METHOD

The present study was conducted as an in-vitro study after obtaining approval from the ethical committee, Saveetha university. Deciduous molars that were retained or intact primary teeth indicated for extraction due to orthodontic purposes were collected and stored in sterile water. A total of 40 teeth was obtained and was divided into 2 groups (20 per group), with each group receiving either SSCs or Figaro crowns.

The teeth were wiped with gauze and removal of carious lesion if present was done. Diamond burs were used to pre-

pare the tooth according to the manufacturers instructions and Glass ionomer cements were used to cement the crowns in both the groups.

After cementation with either SSCs or Zirconia crowns, the teeth were placed in DPBS solution for 24 hours at 37 degrees followed by placing it in the thermocycler for 6000 cycles between 5-55 degrees Celsius. The teeth were then

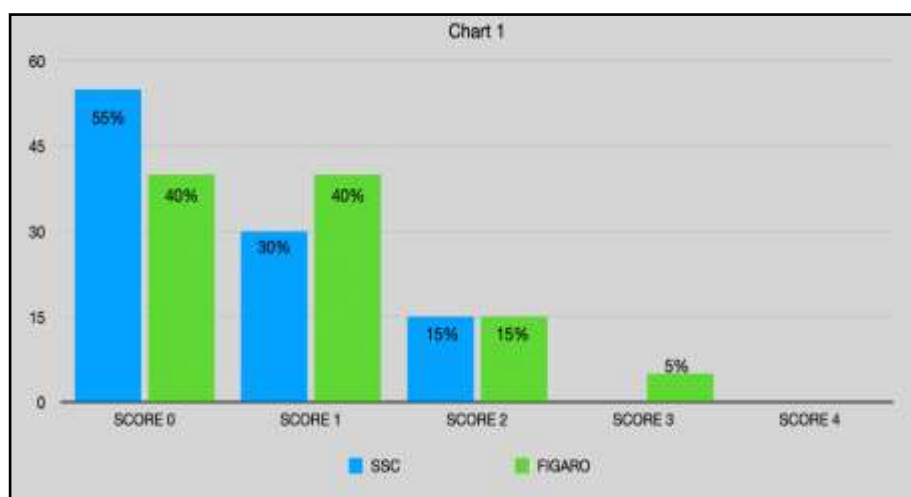
painted with acrylic varnish within 1 mm of the crown margin and were placed in 2% basic fuchsin solution for 24 hours. Sectioning of the specimens bucco-lingually was done and were viewed under stereo-microscope. The scoring of the marginal leakage was done according to the scoring criteria depicted in Table 1.

**Table 1.** Category of marginal leakage scores

SCORING	DESCRIPTION
0	Microleakage at the margins of crown only
1	Microleakage at the margins of crown and around the cements
2	Microleakage at the margins of crown and throughout the cements
3	Microleakage to 1/3 of tooth structure
4	Microleakage throughout the tooth structure and pulp

## RESULTS

All the samples included in the study showed Marginal leakage. 55% of SSCs and 40% of Figaro crowns showed marginal-leakage at the margins of the crown only. Both the crowns did not show any marginal-leakage involving throughout the tooth and the difference was also not statistically significant (p=0.62). The grade of Marginal leakage in each group is depicted in Graph 1 and the statistical significance is shown in Table 2.



**Graph.1:** Microleakage scores of SSCs and Figaro crowns.

**Table 2.** Microleakage scores of SSCs and Figaro crowns, Chi square test, p<0.05 statistically significant.

Variable		Marginal Leakage Scores					P value
		SCORE 0 n(%)	SCORE 1 n(%)	SCORE 2 n(%)	SCORE 3 n(%)	SCORE 4 n(%)	
Groups	SSC	11(55)	6(30)	3(15)	0(0)	0(0)	0.62
	FIAGRO	8(40)	8(40)	3(15)	1(5)	0(0)	

## DISCUSSION

Tooth decay being the most prevalent chronic disease in children despite various preventive measures serves to be challenging for the dental practitioners. (11,12,13,14) Despite the availability of various durable materials, aesthetic quest of the parents and the children kept the ball rolling towards more aesthetic and biocompatible options. Ready made fibreglass crowns - Figaro is one such option for aesthetic full coverage restoration.(9,10) However, the other factors determining its success remains unexplored and

hence the present in-vitro study was conducted to comparatively evaluate the Marginal leakage of Figaro crowns in primary molars.

In the present study, it was seen that all the specimens irrespective of SSC or Figaro showed some degree of marginal-leakage. However none of the crowns showed Microleakage throughout the tooth structure and only 1 Figaro crown showed Microleakage extending to 1/3 rd of the tooth structure. 15% of both Figaro and SSC showed micro-leakage at the margins of the crown and throughout the cements. The remaining 80% of the Figaro crowns showed marginal-leakage confined to the margins of the crown and around

the cements only and also there was no statistically significant difference between the two crowns.

The results of the present study demonstrates that Figaro crowns are very much similar to the conventional SSCs in terms of marginal leakage. This could be attributed to the similar kind of tooth preparation needed for Figaro crowns and also, the manufacturers state that Figaro crowns are based on the flex fit technology which will provide tight margins and thus reduction in marginal leakage.(10) The type of cement used for luting also plays an important role in determining the marginal-leakage. In the present study Glass Ionomer cements were used for cementing both the crowns as studies have stated that Glass Ionomers shows high clinical success rates in SSCs.(2,15,16) However more studies has to be conducted with various types of cements and find the best suitable cement for Figaro crowns.

## CONCLUSION

The degree of marginal-leakage shown by Figaro crowns are similar to that of Stainless steel crowns and hence, Figaro crowns can be considered as a promising aesthetic replacement to SSCs.

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