

Original Research

Comparison between zirconia, luxa, strip crowns: A randomised controlled trial

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ABSTRACT:

Background: To evaluate zirconia, luxa and strip crowns. **Materials & methods:** A total of 45 subjects were enrolled. Age of patients was 5 to 10 years. 60 deciduous teeth were included. The crowns were divided into 3 groups with 20 in each group. Group 1: zirconia, group 2: luxa crowns and group 3: strip crowns. Data was collected and result was analysed using chi-square test and SPSS software. **Results:** It can be seen that at the 3-months follow-up significantly more teeth in the strip crown group were bleeding compared to the zirconia group. However, at the last follow-up visit at 9 months all the groups showed no bleeding. No secondary caries was seen in zirconia crown and luxa crowns at 3, 6, and 9-month intervals. But resin strip crowns showed 30% of cases with secondary caries. **Conclusion:** Zirconia and luxa crowns were the best esthetic crowns for primary anteriors.

Keywords: zirconia, luxa crowns, strip crowns.

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INTRODUCTION

There has been rapid development in the field of dentistry in the area of esthetic dentistry. Researchers and clinicians have directed their interest towards the esthetic solutions in the restorative process to provide naturally colored, durable, long-lasting restorations that society currently demands. This esthetic direction seems to afford the child a sense of health, safety, self-esteem. ¹ Crowns are the preferred final restoration for primary teeth restoration as they outperform the direct restorations and increase the success rate of endodontic treatments due to their better sealing abilities. ²

Dental caries is considered the most common infectious disease globally. ³ Internationally, 60–90% of children suffer from this disease. ⁴ When left untreated, caries could severely damage the tooth structure which will require restoration to one or more of the tooth surfaces. If it progresses further, the tooth pulp will be affected, and inflammation may result. ⁵ At this stage, the tooth may require pulp therapy, and most probably the remaining tooth structure will need to be covered with a crown. This may be necessary to maintain the integrity of the treated tooth until the eruption of its permanent

successor. Primary teeth play an important role in preserving space in the arch for the permanent teeth beside their important functions in speech and mastication. ⁶ For this reason, it is best to treat primary molars with extensive and large carious lesions, multiple affected surfaces or that have undergone pulp therapy with full coverage restorations or crowns. Full coverage is essential to provide long-term protection and durability and prevent recurrent decay. ⁷

The technological advances in material science led to the evolution of preformed zirconia crowns for primary teeth, so as to fulfill the esthetic demands, at the same time promise good durability. Zirconia crowns are known as “Ceramic Steel” as it provides strength close to available metal crowns as well as color similar to that of natural teeth. Pediatric zirconia crowns were introduced by EZ-pedo and became commercially available in 2008. Later preformed zirconia crowns were popularized by companies like Nusmile, Kinderkrowns, Cheng crowns, Signature crowns, and many more. These preformed crowns differed with respect to size, shape, shade, and pattern of retention component. ⁸ Hence, this study was conducted to evaluate zirconia, luxa and strip crowns.

MATERIALS & METHODS

A total of 45 subjects were enrolled. Age of patients was 5 to 10 years. 60 deciduous teeth were included. The crowns were divided into 3 groups with 20 in each group. Group 1: zirconia, group 2: luxa crowns and group 3: strip crowns. Medical and dental history was taken. Patients were recalled after 3,6 and 9 months to evaluate the gingival health, secondary caries and marginal discoloration. Data was collected and result was analysed using chi- square test and SPSS software.

RESULTS

A total of 60 deciduous crowns were included. Gingival health as measured by bleeding with probing was recorded. It can be seen that at the 3-months follow-up significantly more teeth in the strip crown group were bleeding compared to the zirconia group. At the 6-months follow-up also more number of teeth in the strip crown group were bleeding. However, at the last follow-up visit at 9 months all the groups showed no bleeding.

Table 1: Gingival health (bleeding on probing)

Gingival health (bleeding on probing)	Zirconia crown	Strip crown	Luxa crown
At 3 months	4 (20%)	6 (30%)	4 (20%)
6 months	0 (100%)	5 (25%)	0 (100%)
9 months	0 (100%)	0 (100%)	0 (100%)

Table 2: secondary caries

Groups	3 month	6 months	9 months	
	No caries	No caries	No caries	Caries present
Strip crown	100%	100%	14(70%)	6 (30%)
Zirconia	100%	100%	100%	-
Luxa crowns	100%	100%	100%	-

Secondary caries of zirconia crowns, luxa crowns and resin strip crowns were compared. Statistically significant difference was found between them at 9 months. No secondary caries was seen in zirconia crown and luxa crowns at 3, 6, and 9-month intervals. But resin strip crowns showed 30% of cases with secondary caries. The zirconia crowns showed no marginal discoloration whereas at 9 month interval, the strip crowns and luxa crowns showed high discoloration in teeth as 20%, 10% respectively.

Table 3: marginal discoloration

Groups	3 months	6 months		9 months		
	No discoloration	No discoloration	Slight discoloration	No discoloration	Slight discoloration	High discoloration
Strip crown	20 (100%)	17 (85%)	3 (15%)	14 (70%)	2 (10%)	4 (20%)
Zirconia	20 (100%)	20 (100%)	0	20 (100%)	0	0
Luxa crowns	20 (100%)	18 (90%)	2 (10%)	18 (90%)	0	2 (10%)

DISCUSSION

Zirconia crowns are indicated as the same as any other available type of crown in pediatric dentistry. However, there are some potential drawbacks of zirconia crowns such as the difficulty of adjustments to provide mechanical retention in contrast to stainless steel crown, the limitation of the shades available in the clinics, and the prolonged procedure time. The zirconia crowns require more tooth structure reduction to accomplish better adaptation. Pulpal exposure and postoperative complications also have been noted during the preparation for zirconia crowns.⁹ Even with the variety of companies and esthetic demands, zirconia crowns are considered to be expensive when compared to other treatment alternative.^{9,10} Hence, this study was conducted to evaluate the zirconia, luxa and strip crowns.

In the present study, a total of 60 deciduous crowns were included. Gingival health as measured by bleeding with probing was recorded. It can be seen

that at the 3-months follow-up significantly more teeth in the strip crown group were bleeding compared to the zirconia group. At the 6-months follow-up also more number of teeth in the strip crown group were bleeding. However, at the last follow-up visit at 9 months all the groups showed no bleeding. A study by Nischal M et al, evaluated the surface texture, anatomical form, marginal integrity, marginal discoloration, and secondary caries of three different types of crowns in primary anterior teeth at different time intervals of 3, 6, and 9 months. Total 45 primary maxillary incisors were randomly selected and divided into three groups of 15 each: group I—strip crowns (Pedoform strip crowns, 3M, United States), group II—zirconia crown (kids-e-crown, India), and group III—luxa crown (DMG, Germany). Statistically non-significant difference was observed for most of the parameters except marginal integrity and secondary caries. Resin strip crowns showed

maximum cases with distorted marginal integrity and secondary caries.¹¹

In the present study, secondary caries of zirconia crowns, luxa crowns and resin strip crowns were compared. Statistically significant difference was found between them at 9 months. No secondary caries was seen in zirconia crown and luxa crowns at 3, 6, and 9-month intervals. But resin strip crowns showed 30% of cases with secondary caries. The zirconia crowns showed no marginal discoloration whereas at 9 month interval, the strip crowns and luxacrowns showed high discoloration in teeth as 20% , 10% respectively. Another study by Hanafi L et al, conducted a random clinical trial study as included 63 crowns (31 CCZC, 32 NZC) applied to 44 children aged five to nine years with zirconia crowns placed on anterior or posterior primary teeth. They showed that CCZC did not cause gingival changes after crown application in clinical tissue appearance, bleeding, and gingival recession. Reduced plaque accumulation was observed during follow-up periods. Finally, there was no statistically significant difference between CCZC and NZC.¹²

Another study by Alaki SM et al, compared prefabricated primary zirconia with resin composite strip crowns on primary maxillary central and lateral incisors with regards to gingival health, plaque accumulation, recurrent caries, restoration failure, and opposing teeth wear over a period of 3, 6 and 12 months. A total of 120 teeth were treated; 60 with zirconia and 60 with strip crowns. Level of significance was set at ($\alpha=0.05$) and level of confidence at (95%). Zirconia crowns showed significantly less gingival bleeding at the 3- and 6-months follow up periods ($p<0.006$, $p<0.001$; respectively), less plaque accumulation at all follow up visits ($p<0.001$), no restoration failure ($p<0.001$), but more wear to opposing teeth ($p<0.02$). No significant difference was found between the two crowns with regards to recurrent caries ($p<0.135$).¹³

CONCLUSION

Zirconia and luxa crowns were the best esthetic crowns for primary anteriors.

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