



INTRODUCTION

Esthetic restorations are very important in the anterior maxilla. This is also true within the field of Pediatric Dentistry. Parental satisfaction is an important factor and the use of stainless steel crowns (SSCs) has been found to be an unacceptable esthetic outcome by the parents for primary maxillary incisor teeth.¹ Two of the most commonly used esthetic restorations used today by pediatric dentists for anterior maxillary teeth are resin strip crowns (RSCs) and prefabricated zirconia crowns (PZCs). For many years, RSCs have been the esthetic restoration of choice for maxillary primary incisors. RSCs are clear plastic formers replicating the shape of a natural maxillary primary incisor. After the tooth is prepared and caries is excavated, the former is filled with resin, seated on the prepared tooth, light cured, and the plastic former is removed. The major advantages of RSCs are that they are very esthetic, can be repaired, and are relatively cheap; however, contamination from moisture can hinder the bonding ability of the resin.² Recently, the use of PZCs (Figure 1) has become more popular amongst pediatric dentists. Zirconia is a very popular indirect restorative material and is heavily utilized within digital dentistry workflows.³ Zirconia crowns in the primary dentition have been shown to have superior gingival health and decreased plaque accumulations when compared to SSCs.⁴ Parents also report higher levels of satisfaction for zirconia than RSCs and pre-veneered SSCs.⁵ A systematic review on esthetic preformed pediatric crowns was conducted in 2017.⁶ Within this review, only one randomized controlled trial was included evaluating esthetic full coronal restorations for anterior maxillary incisors. Most of the literature conducted at the time of this review revolved around the evaluation of zirconia vs. SSCs. Due to the increasing popularity of zirconia as a restorative material in the primary dentition, a systematic review should be conducted evaluating the clinical success of prefabricated zirconia crowns as a restoration in primary maxillary anterior teeth.



Figure 1. Clinical photo courtesy Dr. Lauren T. Little: NuSmile® ZR zirconia crowns on primary maxillary incisors (teeth #D, #E, #F, and #G) on a 3YOF receiving treatment under general anesthesia.

OBJECTIVE

The purpose of this systematic review is to evaluate the clinical success of prefabricated zirconia crowns compared to resin strip crowns for primary maxillary anterior teeth.

METHODS

Protocol. This systematic review was carried out in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) checklist. The PICO method (Population, Intervention, Comparison, Outcome) was used to formulate the search query: the population was children requiring a maxillary anterior full-coverage restoration; the intervention was prefabricated zirconia crowns (PZCs); the comparison was resin strip crowns (RSCs); and the outcome was longevity, wear to opposing dentition, and gingival health.

Information sources and search strategy. The search for this review was carried out in the following databases: PubMed, Web of Science, and EBSCOhost. Additionally, a search within the database for the American Academy of Pediatric Dentistry was performed. The following terms were searched within each of the databases: “zirconia,” “strip crowns,” “primary tooth,” and “maxillary incisors.” The search was completed by the principal investigator.

Eligibility criteria. Randomized controlled trials (RCTs) published within the last 10 years comparing resin strip crowns and PZCs were included within this review. Case reports and clinical studies were not included. Additionally, only literature published in the English language was included.

Study selection and data collection process. The gathered references obtained from the investigator’s search were exported to EndNote X9. The references were screened by the principal investigator, first by title and abstract. Any duplicated studies were excluded. The principal investigator then performed a full-text analysis of the references, excluding those that did not fulfill the inclusion criteria previously outlined. Figure 2 illustrates the number of articles revealed from the database searches and how many articles remained after excluding duplicates and those that did not meet the inclusion criteria. For those studies meeting the inclusion criteria for this review, characteristics of the studies (follow up schedule, participants, interventions, outcomes, and results) were recorded within Table 1.

Risk of bias. To assess the risk of bias for the included randomized controlled trials within this review, the Cochrane risk of bias tool was employed.⁷

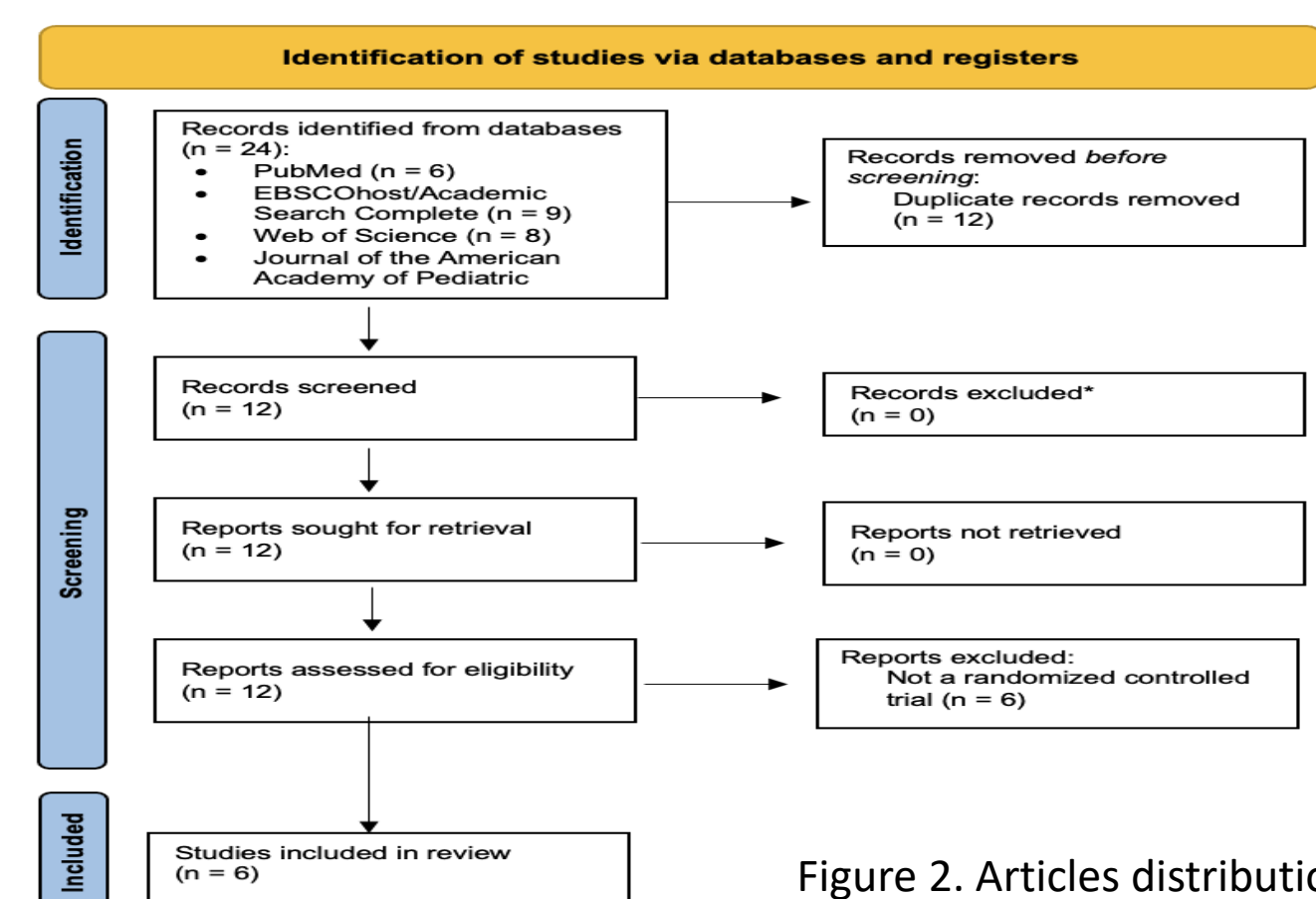


Figure 2. Articles distribution.

CONCLUSIONS

From the results of this review, the following conclusions can be made:

1. Zirconia crowns have lower plaque retention and less gingival bleeding compared to strip crowns.
2. Crown retention, durability, and wear to opposing dentition was higher for zirconia than strip crowns.
3. Restoration failure of strip crowns was higher than that of zirconia.
4. Pulpal survival rates were similar between strip crowns and zirconia.
5. Ultimately, more systematic reviews need to be conducted to further evaluate the success and efficacy of zirconia as a coronal restoration in primary maxillary incisor teeth.

RESULTS

Table 1: Characteristics of the Selected Randomized Controlled Trials

Authors (reference) Country	Study design (follow-up)	Participants (age) Teeth	Intervention comparisons	Outcomes	Results	Risk of bias
Alaki et al. (2020) ⁸ Saudi Arabia	Randomized clinical trial (3 months, 6 months, and 12 months)	32 participants (4-6 years) 120 teeth treated (60 zirconia, 60 strip crowns)	Prefabricated primary zirconia crowns and resin strip crowns in primary anterior teeth in children	Gingival health Plaque accumulation Recurrent caries Restoration failure Opposing teeth wear	<ul style="list-style-type: none"> • Zirconia had less gingival bleeding (3- and 6- months; p<0.006, p<0.001) • Zirconia had less plaque accumulation at all follow ups (p<0.001) • Zirconia had no restoration failures (p< 0.001) • Zirconia wore opposing dentition more than resin strip crowns (p< 0.02) • No significant difference between zirconia and resin strip crowns for recurrent caries (p< 0.135) 	Some concerns
Gill et al. (2020) ⁹ United States	Single-blinded, randomized clinical trial (12 months)	49 participants (2-4 years) 135 teeth treated (48 composite strip crowns, 47 pre-veneered SSCs, and 40 zirconia crowns)	Composite strip crowns, NuSmile pre-veneered SSCs, and NuSmile zirconia crowns in primary maxillary incisor teeth in children receiving restorative treatment under general anesthesia	Clinical outcomes Parental satisfaction	<ul style="list-style-type: none"> • At 12 month follow up, crown retention was significantly lower for composite strip crowns than zirconia and pre-veneered SSCs (79%, 100%, and 95%, respectively; p< 0.002) • Composite strip crowns had higher marginal discrepancies and color changes (p< 0.001) • Most parents were satisfied with child’s restorations (87%) • Parents who were displeased with restorations were concerned with the color of the composite strip crowns and pre-veneered SSCs (63% and 37%, respectively; p< 0.005) 	Some concerns
Ozdemir et al. (2022) ¹⁰ Turkey	Prospective, randomized, clinical trial (1 month, 6 months, 12 months, 18 months)	25 participants (3-5 years) 111 teeth treated (86 teeth were crowns, 25 control teeth)	Preformed zirconia and composite strip crowns in primary maxillary incisors in cooperative children aged 3-5 years	Retention Gingival health and plaque index Pulpal health	<ul style="list-style-type: none"> • Zirconia had lower plaque index scores than strip crowns and control teeth at all recall intervals (p < 0.05) • Zirconia had better retention than strip crowns (p < 0.05), with rates of 100% and 77.8% respectively • Both types of crowns had high pulp survival rates at 18 months – zirconia was 93.1% and strip crowns were 95.4% • Ultimately, zirconia had superior clinical performance to strip crowns in the following categories: retention, restoration failure, and color changes • Both crowns showed similar gingival and pulpal health after 18 month follow-up 	Some concerns
Salami et al. (2015) ⁵ United Arab Emirates	Randomized clinical trial (12 months)	39 participants (3-5 years) 129 teeth treated (43 strip crowns, 43 pre-veneered SSCs, and 43 zirconia crowns)	Resin strip crowns, pre-veneered SSCs, and zirconia crowns in the treatment of carious and traumatized primary maxillary incisors in children	Parental satisfaction	<ul style="list-style-type: none"> • Parents overall reported satisfaction with all three tooth colored, full-coverage restorations included within the study • Significant associations were found between the durability of strip crowns and parental satisfaction (p = 0.009) and the color of pre-veneered SSCs and parental satisfaction (p = 0.003) 	Some concerns
Sharma et al. (2021) ¹¹ India	Randomized clinical trial (12 months)	24 participants (3-5 years) 40 teeth treated	Strip crowns and preformed zirconia crowns in 3-5 year old children	Parental satisfaction	<ul style="list-style-type: none"> • Relationship between overall satisfaction and durability of strip crowns (p = 0.004) was statistically significant • Statistically significant relationship found between overall parental satisfaction and color of zirconia crowns (p = 0.043) • Overall higher parental satisfaction was found with zirconia crowns • Parents more satisfied with durability of zirconia, compared to that of strip crowns 	Some concerns
Walia et al. (2014) ¹² United Arab Emirates	Randomized clinical trial (6 months)	39 participants (3-5 years) 129 teeth treated (43 strip crowns, 43 pre-veneered SSCs, and 43 zirconia crowns)	Resin composite strip crowns, pre-veneered SSCs, and pre-fabricated primary zirconia crowns in children 3-5 years of age	Restoration failure Abrasion on opposing dentition Gingival response	<ul style="list-style-type: none"> • Resin composite strip crowns have a lower retention rate due to sensitive technique and higher gingival inflammation • Pre-veneered SSCs showed retention, but were more prone to restoration fracture on facial veneer • Pre-fabricated zirconia crowns have high retention and cause less gingival inflammation, but can cause abrasion and wear to opposing dentition 	Some concerns

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