



Aesthetic preformed paediatric crowns in primary incisors: a bibliometric study and critical analysis

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Abstract

Purpose The aim of this bibliometric study was to assess clinical research regarding preformed crowns used for the treatment of primary anterior teeth.

Methods A search was conducted in the Web of Science Core Collection (WoSCC) for publications on preformed crowns for primary anterior teeth, and was completed in a single day (August 8, 2025), identifying 379 articles. After filtering for original research and case report/series published in English, 40 relevant articles were selected for review. These publications were evaluated based on annual publication trends, study designs, journals, citation counts, authors, and keywords, using the ‘biblioshiny’ program in RStudio. Additionally, the review included critical analysis of articles with full texts to collect detailed information on study design, sample size, and clinical outcomes.

Results The review of 40 articles over three decades showed a 4.57% annual increase in publication number on preformed crowns for primary anterior teeth, especially since 2012, with USA authors leading. The data reveal temporal trends in preveneered preformed metal crowns for anterior primary teeth, strip crown success, zirconia crowns (gingival health, quality of life and parental satisfaction comparisons), and preformed crowns for primary anterior teeth after pulpal treatment. Amongst them, the journal “Pediatric Dentistry” had published the most papers. Recent studies highlighted zirconia crowns’ high retention and gingival health benefits, whilst strip crowns showed lower durability.

Conclusion For anterior primary teeth, that zirconia crowns offered high durability, aesthetics, and parental satisfaction. The heterogeneity of study designs underscores the necessity for more comprehensive research to inform paediatric dentistry practices.

Keywords Anterior · Aesthetic · Crowns · Primary incisors

Introduction

Early childhood caries (ECC) is defined as the presence of one or more carious tooth surfaces (either non-cavitated or cavitated), as well as missing surfaces due to caries or filled surfaces in any primary tooth of a child aged 71 months old

or younger (Drury et al. 1999). Early childhood caries is a major public health concern that impacts populations in both developing and developed countries (Anil and Anand 2017; Masumo et al. 2012). The consequences of untreated carious lesions are well-established; including an increased risk of developing new carious lesions, hospitalisation due to infection, higher rates of school absenteeism, and subsequent declines in academic performance (Jackson et al. 2011). Additionally, untreated carious lesions can cause disruptions in eating and sleeping habits, lead to higher financial costs, and negatively impact the child’s overall quality of life related to oral health (Elheeny and Abdelmotelb 2022; Ladrillo et al. 2006; Sheiham 2006).

There are several options for restoring anterior primary teeth (Elheeny and Abdelmotelb 2022). Full-coverage of primary anterior teeth is recommended when two or more surfaces have carious lesions, when the incisal edge is

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fractured, after pulpal treatment, or when incipient caries is present along with poor oral hygiene (Labbé et al. 2023). Additionally, full coverage crowns are recommended for the restoration of primary teeth with developmental defects (such as hypoplasia or hypomineralisation) where breakdown or carious lesion development are likely, primary teeth that have undergone pulp treatment, or fractured anterior primary teeth with a history of trauma (Waggoner 2015). Aesthetic full-coverage restorations for anterior primary teeth include resin composite strip crowns (SCs) and prefabricated crowns such as pre-veneered preformed metal crowns (PVPMCs), polycarbonate crowns, and zirconia crowns (ZCs).

Each type of crown presents its own unique advantages and drawbacks (Elheeny and Sermani 2024). Strip crowns offer the advantage of minimal tooth preparation, along with good aesthetics and ease of contouring and repair (Christensen 2012); however, they tend to have low wear resistance and are more susceptible to staining and discoloration over time (Kupietzky 2002). Pre-veneered preformed metal crowns are known for their high strength and durability (Beattie et al. 2011), requiring minimal tooth structure removal during placement. On the downside, they have poor aesthetics and limited options for customisation, which may affect patient acceptance (Salama 2018). Polycarbonate crowns provide good aesthetic results with high color-matching capabilities and also require minimal tooth reduction; nevertheless, they have low durability, are prone to chipping, and generally more expensive (Venkataraghavan et al. 2014). Zirconia crowns, on the other hand, are highly regarded for their high strength, durability, and superior aesthetics; their main disadvantages include their high cost, the need for more extensive tooth preparation, and a more complex placement procedure, which may limit their use in certain clinical situations (Szttyler et al. 2022).

Bibliometric analyses are research methods that help identify articles with a significant impact within both academic and clinical communities, using metrics such as citation counts over time (Ellegaard and Wallin 2015; Moed 2009). The quantitative assessment of these articles aids in tracking the development of particular research areas (Guo et al. 2021). Bibliometric studies enable clinicians to identify key research on a specific topic. Moreover, bibliometrics can reveal research trends, highlight leading authors, and identify the journals and countries with the highest publication activity, as well as emerging and promising research areas (Ellegaard and Wallin 2015), thereby encouraging the initiation of new studies (Mattos et al. 2021).

The aim of the present bibliometric study and critical analysis is to examine and analyse clinical research on preformed paediatric crowns used for treating primary anterior teeth.

Materials and methods

Data source and collection

We conducted a search in the Web of Science Core Collection (WoSCC) using the following terms: "crown*" AND ("primary" OR "deciduous" OR "pediatric" OR "paediatric") AND ("teeth" OR "tooth") AND ("incisor*" OR "anterior" OR "esthetic" OR "aesthetic") AND ("clinic*" OR "trial" OR "random*" OR "prospective" OR "retrospective") NOT ("molar" OR "posterior" OR "implant" OR "cross-sectional" OR "cross sectional"). Document types restricted to original research article. A total of 379 article were identified (Fig. 1).

It is important to note that keywords were selected to encompass as much relevant literature as possible in order to minimise the risk of missing data. Consequently, this approach may result in the inclusion of publications that are somewhat distant from the core topic in the literature review. This approach may lead to an inflated count of publications; however, the precise number of relevant publications is determined through detailed review of abstracts and full texts.

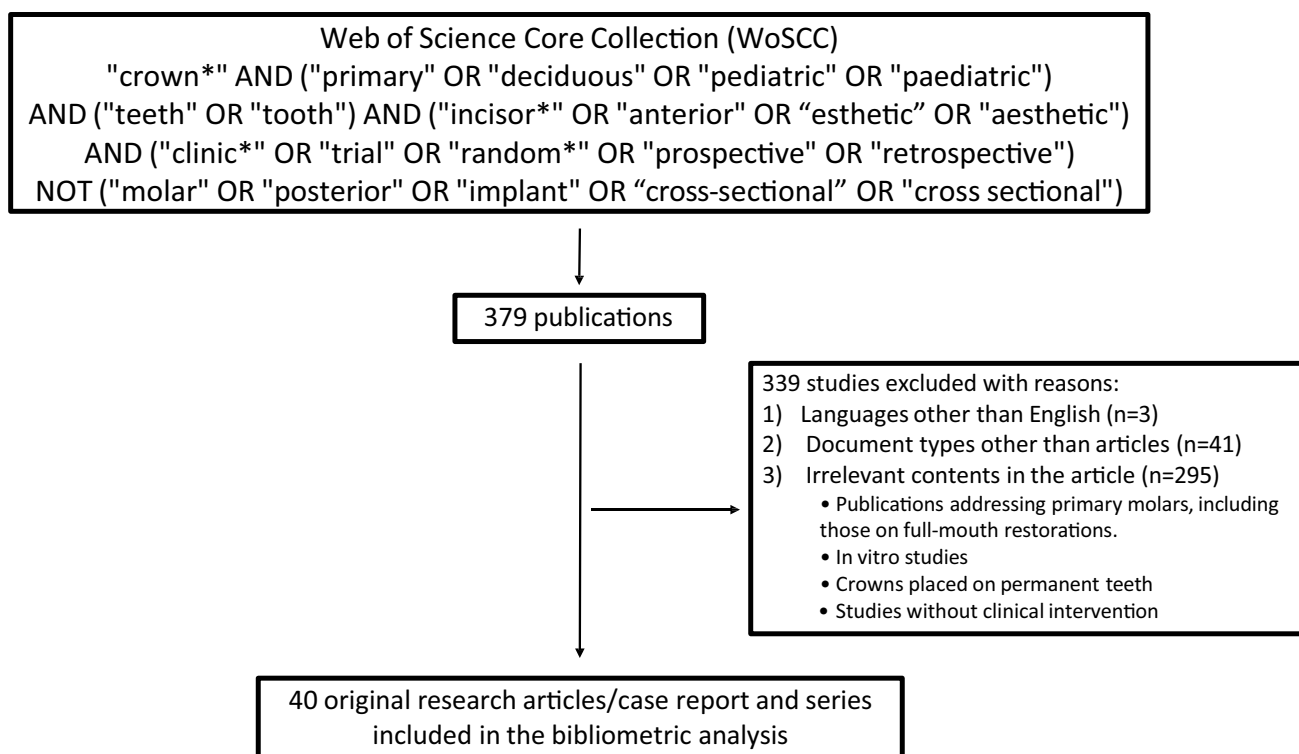
Inclusion criteria

- Crowns placed on primary anterior teeth, with or without prior endodontic treatment
- Original research article and case report/series
- Clinical studies (retrospective and prospective study)

Exclusion criteria

- Article types other than original research articles and case reports/series
- Studies reporting combined data for both anterior and posterior teeth where outcomes of anterior teeth were not analyzed separately
- In vitro studies
- Crowns placed on permanent teeth
- Studies without clinical interventions

Due to the constant publication of papers on the topic, the search was completed in a single day, conducted via Web of Science (WoS) (August 8, 2025). Publications were sourced from the following indexes: Science Citation Index Expanded (SCI-EXPANDED), Emerging Sources Citation Index, Social Sciences Citation Index (SSCI), Conference Proceedings Citation Index – Social Science



Flowchart of data screening and bibliometric analysis

and Humanities (CPCI-SSH), Conference Proceedings Citation Index – Science (CPCI-S).

Data selection

After retrieving articles from the WoS database, two independent researchers screened the titles and abstracts to identify eligible studies. Each researcher independently selected articles for inclusion, and their selections were subsequently compared. Any discrepancies were resolved through full-text review to reach a consensus.

Data analysis

The identified publications were assessed based on publication years, types, journals, number of citations, authors, affiliated institutions, and preferred keywords. Analysis and visualisations were performed using the ‘biblioshiny’ program through the ‘bibliometrix’ package in RStudio 4.4.2 (Ab Rashid 2023).

In the present review, a critical analysis of clinical findings in conjunction with traditional bibliometric metrics were conducted (Maia et al. 2023). Thus, all selected articles except case reports underwent a critical evaluation to extract data on study design, study groups, number of children, teeth count, age range of children, treatment under local or general

anaesthesia, diagnoses, outcome criteria, follow-up periods, and clinical summary (Table 1). Additionally, the study by Wiedenfeld et al. could not be included in the critical review due to the unavailability of its full-text (Wiedenfeld et al. 1994).

Results

The literature review included 40 clinical articles sourced from the Web of Science database, focusing on anterior preformed paediatric crowns in primary teeth published between 1994 and 2025 (Table 1). The annual publication growth rate was 4.57%, with 14.63% of the publications involving international co-authorship. The publications consisted of 21 prospective studies, 11 retrospective studies, and 9 case reports/series. The term “prospective studies” was used broadly to include RCTs, cohort studies, and other prospective observational studies, although RCTs were also considered a specific type of prospective study.

Upon examining the most cited publications, the highest-cited research article was “A randomised controlled trial of three aesthetic full-coronal restorations in primary maxillary teeth” by Walia et al., published in 2014. In Table 1, the articles are ranked in descending order based on their total citation count in the WoS database. In cases where articles

Table 1 Bibliometric profile and critical analysis of articles regarding preformed crowns on primary anterior teeth

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
1	95	Walia et al. (2014)	Prospective Study (RCT)	SC PVSSCs ZC	n = 39 (129 teeth) Age: 3–5 yrs	Local anaesthesia	Dental caries	USPHS Knight Tooth Wear Index Löe and Silness gingival index	6 months	SCs had low retention rates, and PVSSCs often fractured. ZCs were highly retentive and biocompatible but could cause slight abrasion to opposing teeth after six months
2	82	Holsinger et al. (2016)	Retrospective study	ZC	n = 18 (44 teeth)	General anaesthesia or sedation	Dental caries	Clinical evaluation Parental satisfaction	Ranged from 6 to 37 months	EZ-Pedo crowns cemented with glass ionomer show good short- to mid-term retention with high parent satisfaction, and EZ-Pedo zirconia crowns are an acceptable option for primary maxillary anterior teeth
3	60	Ashima et al. (2014)	Case report	Pulpectomised ZC	n = 1 (4 teeth) Age: 4 yrs	Local anaesthesia	Dental caries	Clinical and radiograph evaluation	30 months	Zirconia crowns demonstrated good retention and aesthetics over a 30-month follow-up, with no observed wear on opposing teeth or crown fracture

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
4	44	Kupietzky et al. (2005)	Retrospective study	SC	n = 52 (145 teeth) Age: Average 35.6 months	Local anaesthesia	Dental caries or trauma	USPHS Clinical photograph and radiograph evaluation	36 months	Restorations had an 80% retention rate, with 20% showing some resin loss. Ninety-two percent of teeth had healthy pulps, and 6% had minor changes. SCs effectively restored primary incisors with large caries lesions for over three years
5	43	Ram and Fuks (2006)	Retrospective study	SC	n = 387 (631 teeth) Age: 22–48 months	Oral sedation Local anaesthesia	Dental caries	Clinical and radiograph evaluation	24 months	Over 80% of restorations were deemed successful at the final follow-up. Retention rates were lower for teeth with decay on three or more surfaces, especially in high-carries-risk children
6	40	Salami et al. (2015)	Prospective Study (RCT)	SC PVSSC ZC	n = 39 (129 teeth) Age: 3–5 yrs	Local anaesthesia	Dental caries or trauma	Parental satisfaction	12 months	Parents were most satisfied with ZCs, followed by SCs, and least satisfied with pre-veneered preformed metal crowns. Concerns about durability and color did not affect overall satisfaction

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
7	37	MacLean et al. (2007)	Retrospective study	PVSSC	n = 46 (226 teeth) Age: Average 4 yrs	Nonpharmacologic and pharmacologic behavior management	Dental caries	Clinical and radiograph evaluation	12 months	NuSmile crowns effectively restore anterior primary teeth, with 91% maintaining a good appearance after six months. However, canine crowns are the least successful, often fracturing and appearing bulky. Increased time leads to more attrition with these crowns
8	37	Primosch et al. (2005)	Retrospective study	Pulpotomised SC Resin-based core buildup with SC	n = 48 (104 teeth) Age: 16–53 months	General anaesthesia	Dental caries or trauma	Clinical and radiograph evaluation	Ranged from 6 to 48 months	Incisors restored with a SC had a significantly higher failure rate than incisors treated with resin-based core buildup with SC
9	35	Planells del Pozo and Fuks (2014)	Case report	ZC	n = 1 (4 teeth) Age: 20 months	General anaesthesia	Dental caries	Clinical and radiograph evaluation	3 months	Zirconia crowns demonstrated exceptional fracture resistance. The crown remained intact and stable without cracks following a traumatic injury (lateral luxation) to the tooth just 45 days after placement

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
10	22	Seminario et al. (2019)	Prospective study	ZC	n = 30 (94 teeth) Age: 24–60 months	General anaesthesia	Dental caries	Success: treated incisors stay preserved or exfoliate naturally	36 months	ZCs had survival rates of 93% at 12 months, 85% at 24 months, and 76% at 36 months, making them an aesthetic and viable option for restoring primary maxillary incisors in young children
11	20	Alaki et al. (2020)	Prospective study (RCT)	SC ZC	n = 32 (120 teeth) Age: 4–6 yrs	Local anaesthesia	Dental caries	USPHS Knight Tooth Wear Index Löe and Silness gingival index	12 months	Over time, teeth with ZCs demonstrated better gingival health, less bleeding, reduced plaque accumulation, and lower material loss. However, zirconia could lead to increased wear on opposing tooth structure
12	18	Croll (1998)	Case report	Full text not available						

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
13	17	El Shahawy and O'Connell (2016)	Prospective study	ZC was applied on rigid glass ionomer post	n = 23 (86 teeth) Age: 2–5 yrs	Local or general anaesthesia	Dental caries	Clinical and radiograph evaluation	24 months	The restorations achieved a 95.3% survival rate after 12 months and 80.2% after 24 months. This technique for restoring decayed primary incisors using ZCs offered excellent aesthetics, durability, and positive gingival response up to 24 months.
14	14	Yanover et al. (2021a, b)	Retrospective study	ZC	n = 37 (131 teeth) Age: 24.8–62.2 months	Local anaesthesia	Dental caries	Clinical photograph and radiograph evaluation	Ranged from 6 to 33.8 months	ZCs served as an effective treatment choice for decayed primary maxillary incisors, demonstrating strong marginal integrity, healthy gums, and pleasing aesthetics

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
15	12	Gill et al. (2020)	Prospective study	SC PVSSC ZC	n = 76 (220 teeth) Age: 3–4 yrs	Local anaesthesia	Dental caries	USPHS Parental satisfaction	12 months	Composite strip crowns demonstrated notably lower clinical success in terms of retention, durability, marginal fit, and color when compared to PVSSC or ZCs. Among these options, parental satisfaction with aesthetics was highest for NuSmile ZCs
16	12	Subramaniam et al. (2008)	Prospective Study (RCT)	GFRCR posts and omega-shaped stainless steel wire posts SC	n = 10 (28 teeth) Age: 3–4 yrs	General anaesthesia	Dental caries	Clinical and radiograph evaluation	12 months	Using GFRCR intracanal posts for grossly destructed primary maxillary anterior teeth appears valuable, with higher retention (79%) than omega-shaped stainless steel wire posts (52%) and significantly better marginal adaptation
17	12	Wiedenfeld et al. (1994)	Prospective study	Full text not available						

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
18	11	Elheeny and Abdelmotelb (2022)	Prospective study	ZC SC	n = 138 (344 teeth) Age: 36–71 months	Local anaesthesia	Dental caries	USPHS OHRQOL Parental perception	12 months	After a year, the USPHS criteria for ZCs showed significant superiority over SCs. Additionally, preschool children's oral health-related quality of life was notably better for those treated with ZC compared to those who received SC
19	11	Lee (2018)	Case report	Pulpotomised ZC	n = 1 (1 teeth) Age: 4 yrs	Local anaesthesia	Dental trauma	Clinical and radiograph evaluation	8 days	The report introduced a 'guided tooth preparation' technique using custom resin guides and ultrasonic burs. This method ensured a passive fit and prevented gingival hemorrhage, though the evaluation was limited to the immediate postoperative period (8 days)
20	11	Karaca et al. (2013)	Case series	Full text not available						

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
21	10	Yanover et al. (2021a, b)	Case series	ZC	n = 37 (131 teeth) Age: 24.8–62.2 months	Local anaesthesia	Dental caries	Clinical and radiograph evaluation Parental and dentist satisfaction	Ranged from 6 to 33.8 months	Parents reported 100% overall satisfaction. However, dental evaluators were significantly more critical, rating color match (36%) and contour (55%) lower than parents (84% and 97%, respectively). High retention (99.7%) was observed
22	6	Sonbol et al. (2018)	Retrospectives-tudy	ZC Non-treatment	n = 40 Age: 2–6 yrs	NA	Dental caries	Global Oral Health Rating item Parent-Caregivers Perception Questionnaire (P-CPQ-8) Family Impact Scale (FIS-8)	3–6 months	Parents' perceptions of their children's OHRQoL were similar for treatment of zirconia crown and no restoration. However, children with zirconia crowns experienced more food impaction in approximal regions

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
23	5	Sharma et al. (2021)	Prospective study	SC ZC	n = 24 (40 teeth) Age: 3–5 yrs	Nonpharmacologic behavior management	Dental caries	Clinical and radiograph evaluation Parental satisfaction	12 months	Parents were more satisfied with preformed primary anterior ZCs than with SCs, with a significant correlation between satisfaction and durability of SC and color of zirconia crown The study indicated good crown retention rates for both crown types, with no significant difference between them
24	5	Lopez-Loverich et al. (2015)	Retrospective study	PVSSC SSC	637 teeth Age: Average 47 ± 13 months	Nonpharmacologic and pharmacologic behavior management	Dental caries	Clinical and radiograph evaluation	Average 18 months	Glass fiber-reinforced posts combined with strip crowns demonstrated successful retention and aesthetics for 3 years. Three of the four restorations survived until physiological exfoliation, while one crown failed (debonded) after 2 months
25	4	Afraa et al. (2021)	Case report	Pulpotomised Glass fiber-reinforced posts combined with SC	n = 1 (4 teeth) Age: 4 yrs	Local anaesthesia	Dental caries	Clinical and radiograph evaluation	36 months	

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
26	3	Labbé et al. (2023)	Prospective study	SC ZC	n = 59 (177 teeth) Age: 18–48 months	General anaesthesia	Dental caries	Clinical photograph evaluation	12 months	ZC were rated as intact more often than strip crowns at six and twelve months post-treatment. Furthermore, the frequency of pulp therapy was similar between both groups, indicating comparable dental health outcomes
27	3	Ozdemir et al. (2022)	Prospective Study (RCT)	SC ZC	n = 25 (111 teeth) Age: 3–5 yrs	Nonpharmacologic behavior management	Dental caries	Clinical and radiograph evaluation Silness and Loe plaque index Loe and Silness gingival index	18 months	ZC outperformed composite strip crowns in retention, failure rates, and color change, with similar gingival and pulpal health after 18 months. They also showed the least plaque accumulation compared to sound teeth and SCs

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
28	3	Ou-Yang et al. (2021)	Retrospective study	Pulpectomy ZOE Calcium hydroxide/ iodoform paste SC	n = 124 (309 teeth) Age: 16–60 months	Local anaesthesia	Dental caries	Clinical and radiograph evaluation	24 months	The radiographic success rates are similar between ZOE and Metapex groups, but clinical pathology (pain and soft tissue pathosis) occurs in Metapex recalls and not in ZOE, with radiographic success further influenced by incisor type, pre-operative root resorption, and extent of filling at recalls
29	3	Manmontri et al. (2018)	Retrospective study	SC	n = 41 (131 teeth) Age: Average 4.4 yrs	Nonpharmacologic and pharmacologic behavior management	Dental caries or trauma	Fdi World Dental Federation Criteria	Ranged 12–33 months	SC were clinically acceptable for restoring primary incisors, offering good aesthetic and biological properties but lacking in function over time. Despite parents' low aesthetic satisfaction, overall satisfaction from both parents and patients was high

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
30	2	Elheeny and Sermani (2024)	Prospective Study (RCT)	ZC SC	n = 90 (200 teeth) Age: 36–48 months	Local or general anaesthesia	Dental caries	USPHS Silness and Loe plaque index Loe and Silness gingival index	36 months	After 36 months, the gingival health of ZCs and SCs was similar, but ZCs demonstrated better retention and anatomical continuity than SCs
31	2	Sarapaltseva and Sarapaltsev (2021)	Prospective Study (RCT)	Direct resin composite restoration SC	n = 80 (160 teeth) Age: Average 30 months	Local anaesthesia	Dental caries	Modified Ryge criteria	36 months	Restorations performed with both methods were highly effective and exhibited similar clinical outcomes after postoperatively, regardless of the biological factors associated with caries risk
32	2	Subramanyam and Jeevanand Dan (2018)	Prospective study	3 M ESPE SC KIDS SC	n = 30 (45 teeth) Age: Average 5.56 yrs	Nonpharmacologic behavior management	Dental caries	USPHS Parental satisfaction	1 months	Both crowns demonstrated comparable clinical success rates after one month of follow-up

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
33	2	Castro et al. (2016)	Prospective study	Pedo Jacket crowns with Resin-modified glass ionomer cements (RMGIC)	n=48 (129 teeth) Age: 42.5 ± 13.0 months	Local or general anaesthesia	Dental caries	Clinical and radiograph evaluation	12 months	The ease of use and cariostatic benefits of RMGIC make the Pedo Jacket crown an excellent choice for primary anterior crowns. It effectively manages caries lesions in young children until they can undergo traditional treatments. These crowns can serve as both temporary and permanent solutions, providing unique advantages over rigid crowns, especially for uncooperative children with early childhood caries

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
34	2	Murthy and Deshmukh (2013)	Case report	Pulpectomised Composite shell crowns	n = 1 (4 teeth) Age: 4 yrs	Local anaesthesia	Dental caries	Clinical and radiograph evaluation	NA	A novel indirect technique using a silicone positioner was described. The primary advantage reported was significantly reduced chairside time and ease of simultaneous placement for uncooperative children
35	1	Alrashdi (2024)	Retrospective study	Pulpotomy ZC	n = 81 (81 teeth) Age: 2–5 yrs	NA	Dental caries	Clinical and radiograph evaluation	24 months	Pulpotomy did not meaningfully affect ZC outcomes over a 24 months follow-up
36	1	Devi et al. (2022)	Retrospective study	SC Resin composite restorations Glass-ionomer cement	66 teeth Age: 3–6 yrs	NA	Dental caries	NA	NA	Strip crowns are the more commonly used restorative option for Class III caries in primary maxillary lateral incisors among 3–6 years old with a statistically significant difference in restorative material choice

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
37	1	Yepes et al. (2020)	Retrospective study	RC PVSSC SSC	26,647 teeth Age:1–8 yrs	NA	Dental caries	Clinical evaluation	< 1 to > 7 years	SSCs and PVS-SCs outlast resin crowns, with > 90% survival at six years; SSCs last longer when placed by paediatric dentists than by general dentists
38	0	Chen et al. (2025)	Retrospective study	SC	n = 63 (308 teeth) Age:22–95 months	General anaesthesia	Dental caries	Ram's evaluation criteria (Ram and Fuks 2006)	12 months	SC outcomes depend on patient and tooth characteristics; SCs may be favored for older children and fewer carious surfaces, especially in the lower anterior teeth
39	0	Bani-Hani et al. (2025)	Prospective Study (RCT)	ZC GIC (luting) Self-adhesive resin cement	n = 26 (42 teeth) Age:3–5 yrs	General anaesthesia	Dental caries	Clinical and photograph evaluation Löe and Silness gingival index	12 months	Both GIC and resin-based cements offered sufficient retention for pre-fabricated zirconia crowns and were compatible with gingival tissues; GIC could be considered a feasible alternative to resin-based cements for paediatric zirconia crown cementation

Table 1 (continued)

Rank	Number of citations	Authors	Study design	Study groups	n/ teeth/age	Treatment under local or general anaesthesia	Diagnoses	Outcome criteria	Follow-up periods	Clinical summary
40	0	Shalaby and El Shahawy (2025)	Case series	ZC Composite Prevention	n = 13 (15 fused teeth) Age:3–5 yrs	Local anesthesia General anesthesia	Fused primary teeth / Caries	Clinical and radiograph evaluation	1–4 yrs	Zirconia crowns provided a durable and aesthetic solution for complex fused primary teeth. The crowns maintained superior gingival integration and retention for up to 4 years, outperforming composite resin

*GFR*CR Glass fiber reinforced composite resin, *GIC* Glass ionomer cement, *OHQOL* Oral health-related quality of life, *PVSSC* Pre-veneered stainless steel crown, *RCT* Randomized controlled trial, *SC* Composite strip crowns, *SSC* Stainless steel crown, *USPHS* Modified US Public Health Service, *ZC* Zirconia crowns, *ZOE* Zinc oxide eugenol

had the same number of citations, priority was given to more recent publications.

Significant interest in anterior paediatric crowns has notably increased since 2012, with 33 publications published between 2012 and 2025, as shown in Fig. 2. The average annual citations have fluctuated significantly since 1994, with 2014 marking the peak at 5.28 citations per publication (Fig. 3). The first publication in this area was by Wiedenfeld et al., titled “An Aesthetic Technique for Veneering Anterior Stainless Steel Crowns with Composite Resin,” published in 1994 (Wiedenfeld et al. 1994).

A total of 40 articles were published in 17 different journals. The journals that contributed most to publishing research on anterior primary teeth crowns were “Paediatric Dentistry”, “Journal of Clinical Paediatric Dentistry” and “Journal of Dentistry for Children” (Table 2). Amongst them, “Paediatric Dentistry” published the most papers.

The highest value of h-index, which is used to identify influential authors in bibliometric analyses, was found to be 3 for Kupietski A., therefore, he can be considered the most prolific and influential author on this topic. The USA stands out as the most productive country, with the highest number of citations in research on anterior primary crowns (Fig. 4).

A total of 95 keywords were used across the 40 publications. The most frequently used keywords were “parental satisfaction” ($n=8$), “primary incisors” ($n=7$), “full coronal restorations” ($n=6$) and “stainless steel crowns” ($n=5$).

Figure 5 analyses the trend distribution over the years, showing that stainless steel crowns are predominantly used as preveneered composite restorations for anterior primary teeth; the clinical success of strip crowns was subsequently evaluated; the introduction of zirconium crowns has led to comparisons of gingival health and health-related quality of life across studies; and more recently, evaluating the success of paediatric crowns following pulpal treatments has become a key focus (Alrashdi 2024; Ou-Yang et al. 2021).

Discussions

Restoring primary incisors affected by ECC often presents significant challenges for paediatric dentists. The gingival tissues in ECC patients are often inflamed, resulting in bleeding that can hinder the success of resin composite restorations (Ram and Fuks 2006). Additionally, the unique anatomy of primary incisors, characterised by their small size, thin enamel, and close proximity to the proportionally larger dental pulp, makes successful intracoronal restorations difficult to achieve (Croll 1998). Furthermore, managing the behaviour of young patients adds another layer of complexity to the treatment process. Therefore, it is essential to identify the most suitable material for restoring the

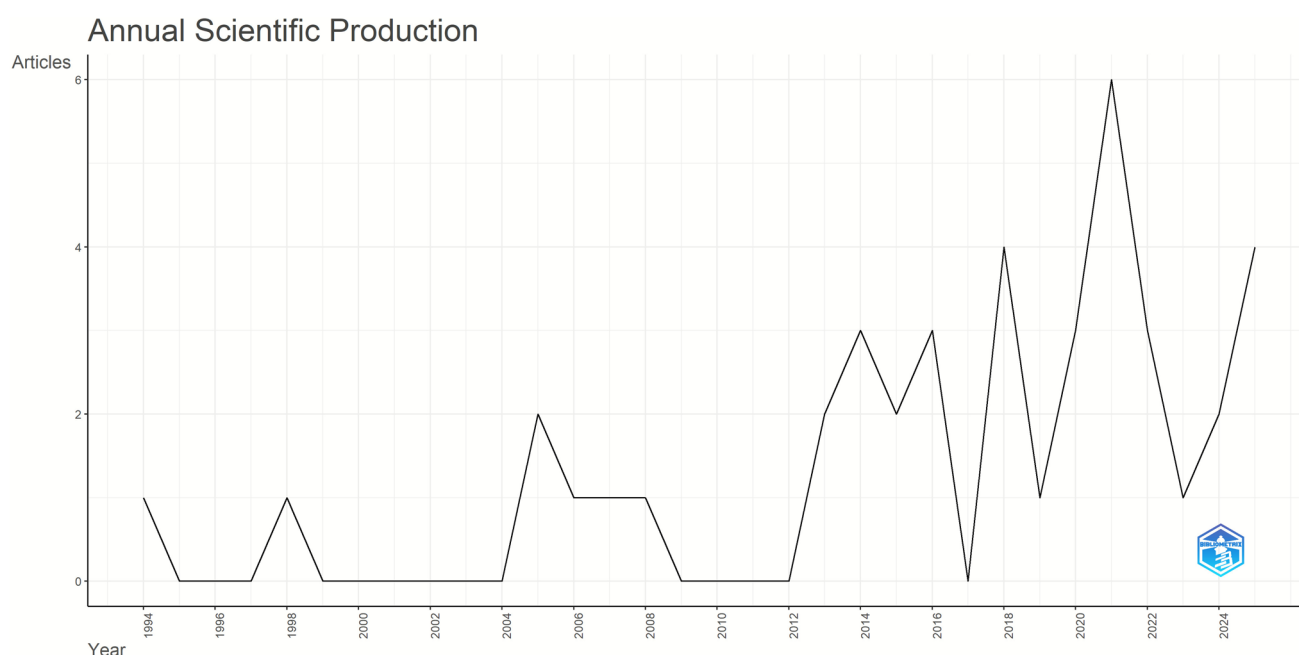


Fig. 2 Distribution of publications by year of aesthetic preformed paediatric crowns

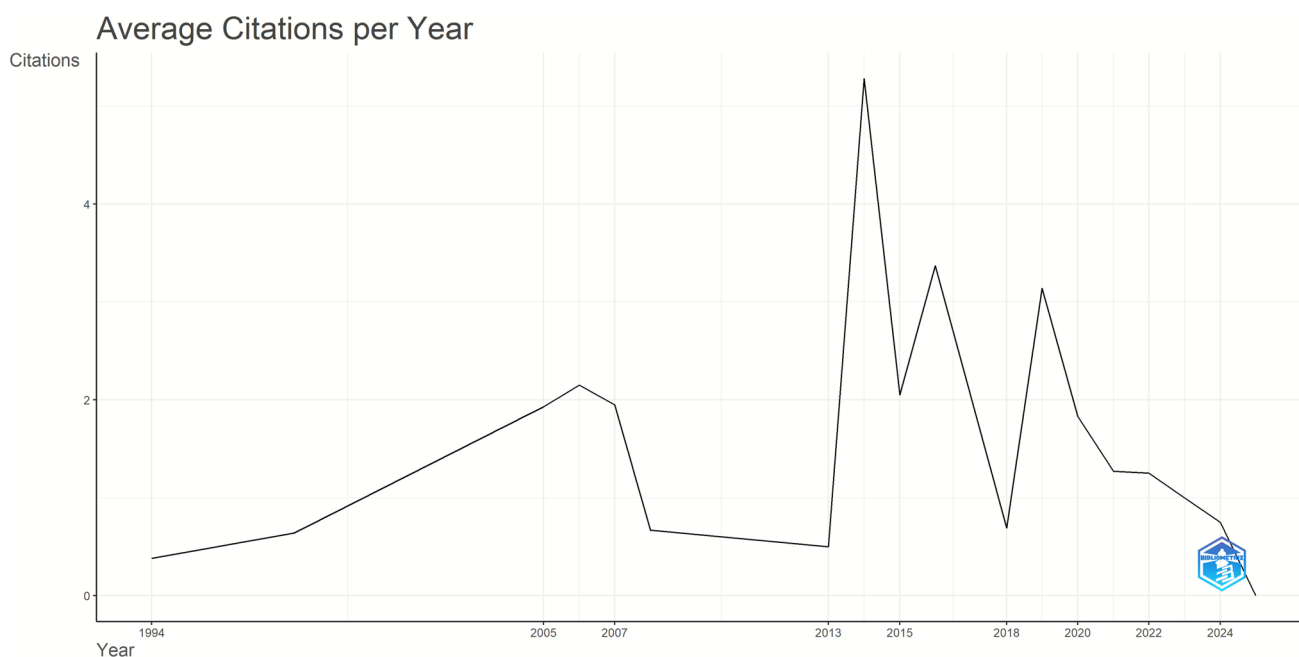


Fig. 3 Distribution of citation counts by year of aesthetic preformed paediatric crowns

function of carious or fractured primary incisors (Ferraz et al. 2014).

A total of 40 clinical articles were included and analysed, the annual publication growth rate of 4.57% suggesting a consistent increase in interest and research activity surrounding aesthetic options for anterior primary teeth. This upward trend was particularly notable since 2012, when there was a

notable surge in publications, signifying recognition within the dental community of the importance of aesthetic considerations in paediatric dentistry, reflecting a shift towards prioritising the holistic experiences of young patients and their families. It is also essential to consider the implications of this research trend on patient outcomes. As aesthetic preformed crowns become more widely accepted and utilised,

Table 2 Journals with two or more publications regarding crowns of anterior primary teeth

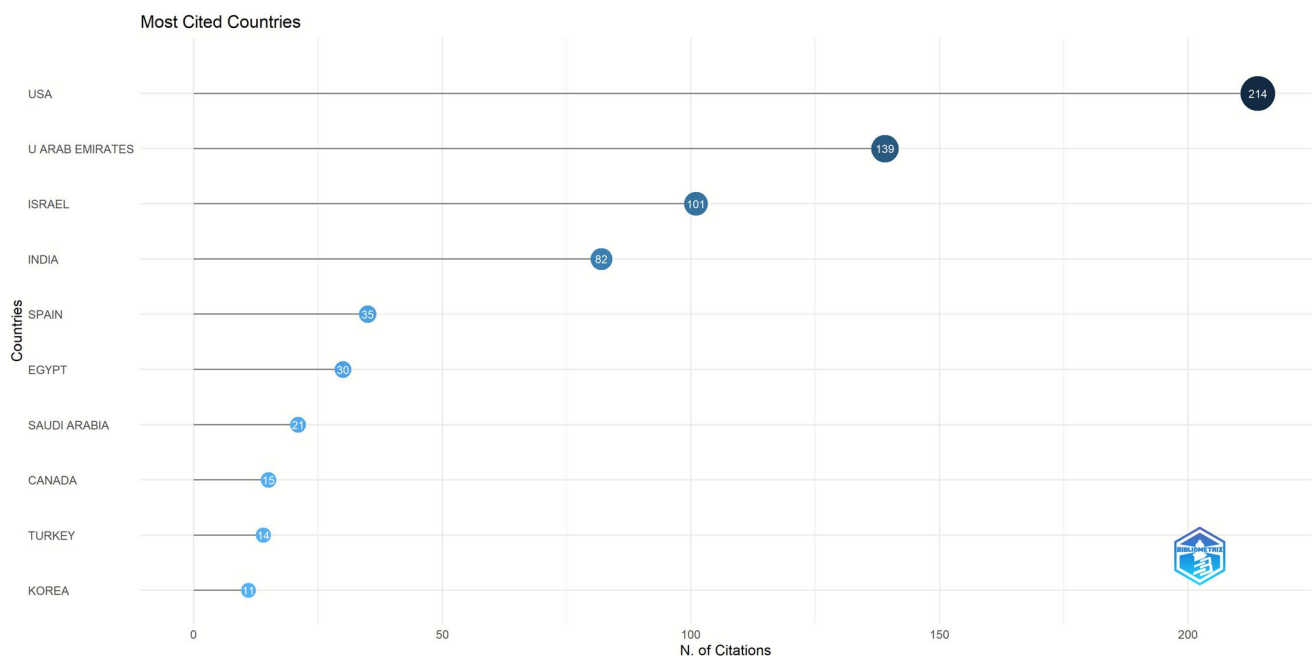
Source	Number of publications
Paediatric Dentistry	10
Journal of Clinical Paediatric Dentistry	7
Journal of Dentistry for Children	4
Case Reports in Dentistry	2
Children-Basel	2
European Archives of Paediatric Dentistry	2
European Journal of Paediatric Dentistry	2
Paediatric Dental Journal	2

the potential for improved patient satisfaction, compliance, and overall oral health outcomes increases (Elheeny and Abdelmotelb 2022; Sharma et al. 2021). Parents are increasingly seeking dental solutions that not only restore function but also maintain or enhance the appearance of their children's teeth (Gill et al. 2020; Salami et al. 2015). This demand positions aesthetic crowns as a critical component of paediatric dental practice, necessitating that practitioners stay abreast of the latest research and developments in this field.

Geographically, the USA emerges as the leading country in this research field, producing the highest number of publications and citations, which can be attributed to several factors, including robust funding opportunities, extensive research resources, and a well-established clinical

infrastructure that fosters innovation and exploration in paediatric dentistry (Espinoza et al. 2025; Ferland et al. 2017). Moreover, the involvement of other countries, such as the United Arab Emirates, Israel, India, Spain and Egypt, highlights the global interest in aesthetic solutions for paediatric dental care. International collaboration enriches paediatric dentistry by pooling diverse ideas, methods, and clinical experiences from around the world. It enhances research quality and impact by integrating varied perspectives, contributing to a broader understanding of best practices and innovations, and addressing global challenges in paediatric care. (Acedo et al. 2006; Cisneros et al. 2018; Tahamtan et al. 2016).

The analysis of keywords and trend topic distribution by year highlights the evolving nature of paediatric dental treatments (Chen et al. 2020). The present bibliometric data indicates that research interest significantly clustered around veneered resin-faced stainless steel crowns in 2001 (Roberts et al. 2001). This innovation addressed the dual needs for durability and functionality, setting a foundation for subsequent developments in restorative materials. Subsequently, while resin strip crowns have been a well-established technique for decades, a distinct surge in comparative research regarding their clinical success was observed in 2015, providing a more aesthetic option compared to traditional preformed metal crowns. This shift underscores the growing recognition of the importance of aesthetics in paediatric dentistry, as both practitioners and parents increasingly prioritise not only the functionality of restorations but also their visual appeal and influence children's self-esteem and

**Fig. 4** Most relevant countries of aesthetic preformed paediatric crowns on Rstudio

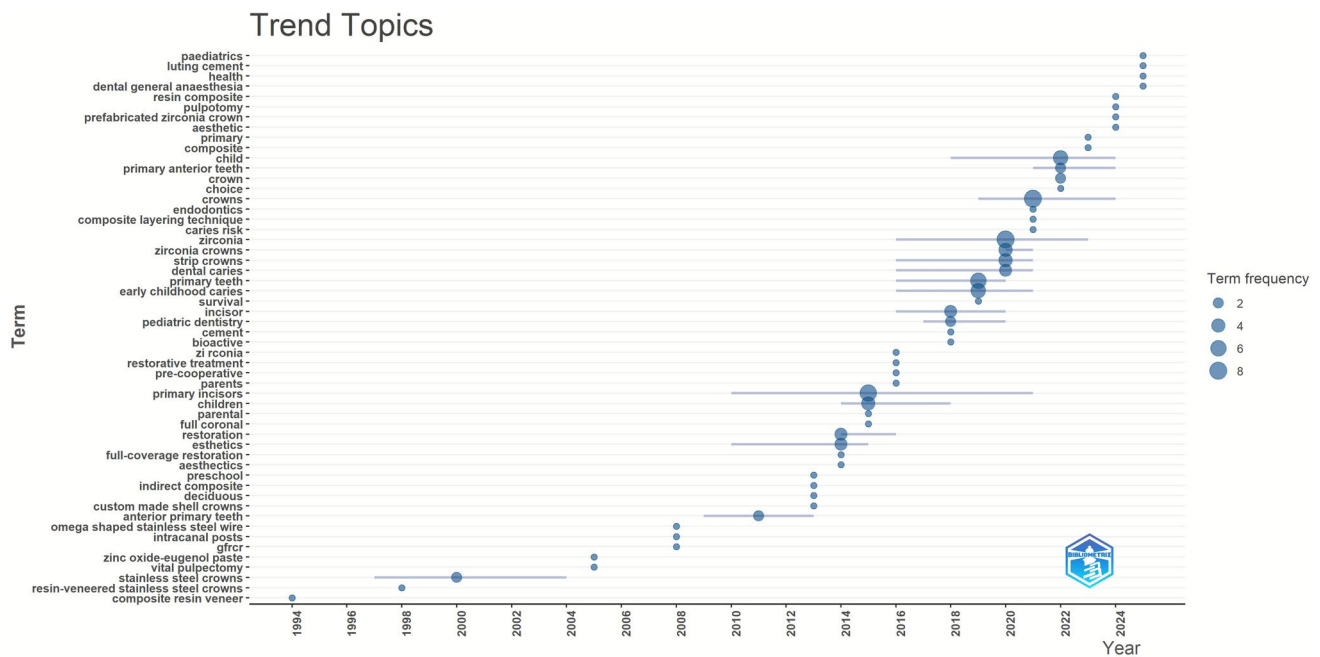


Fig. 5 Trend topics of aesthetic preformed paediatric crowns on Rstudio

overall dental experience (Salami et al. 2015; Soares et al. 2015).

The emergence of zirconia crowns further illustrates this trend, as numerous studies have focused on their impact on gingival health and overall oral health-related quality of life (Alaki et al. 2020; Elheeny and Abdelmotelb 2022; Yanover et al. 2021a, b). Zirconia crowns have gained popularity due to their superior aesthetic properties and biocompatibility compared to other crown types, making them an attractive choice for both practitioners and parents concerned about the long-term effects on young patients (Seminario et al. 2019; Walia et al. 2014). Zirconia crowns have shown improved gingival health with less bleeding, reduced plaque accumulation, and less material loss over time compared to SC (Alaki et al. 2020; Ozdemir et al. 2022). These factors are crucial in paediatric patients, where maintaining oral hygiene can be challenging; however, it is important to note that while ZCs demonstrate these benefits, their application requires significant tooth structure removal, which can increase the risk of pulp exposure and the subsequent need for pulpotomies. Furthermore, they are also linked to increased wear on opposing teeth, a consideration that necessitates careful monitoring and management in clinical practice (Alaki et al. 2020; El Shahawy and O'Connell 2016; Yanover et al. 2021a, b). In comparison, SCs were considered clinically acceptable but lacked long-term effectiveness, leading to lower aesthetic satisfaction from parents (Sharma et al. 2021). Research indicated that both ZCs and SCs applied after pulp therapy achieved similar success rates. (Alrashdi 2024; Ou-Yang et al. 2021; Primosch et al. 2005). This similarity suggests

that, regardless of the crown type used, the underlying health of the tooth structure remains comparable, allowing for similar incidences of pulp-related issues. It highlights the importance of considering not just the material properties of the crowns but also their impact on the overall health of the tooth (Alrashdi 2024; Ou-Yang et al. 2021).

The studies featured various crown types including SC, PVSSCs, and ZCs (Table 1). Different SC variants, highlight the exploration of different aesthetic and functional options for young patients (Subramaniam et al. 2008). Zirconia crowns were often compared to SCs and PVPSCs, with a focus on their retention and durability (Gill et al. 2020; Salami et al. 2015). Overall, the diversity in study groups reflects the complexity of crown selection and underscores the need for continued research to evaluate the effectiveness of these restorative options across different paediatric populations.

The follow-up periods in the studies varied widely, ranging from 1 month to 62.2 months (Table 1). The most common follow-up duration was 12 months. However, longer follow-up periods of 24–36 months provided more detailed insights into the long-term performance of paediatric crowns. With an average follow-up period of approximately 18 months, these studies highlighted the importance of both short-term and long-term assessments to identify potential issues such as durability and patient satisfaction. The variation in follow-up durations suggest a need for standardised protocols in future research, which would improve the reliability of findings and enhance clinical practices in paediatric dentistry. Zirconia crowns have shown high retention

and survival rates, with 93–98% survival at 12 months, 85% at 24 months, and 76% at 36 months (Alaki et al. 2020; Seminario et al. 2019). ZCs also become a good choice for restoring primary maxillary incisors due to their reduced plaque accumulation, better gingival health, and good aesthetics (Alaki et al. 2020; Elheeny and Sermani 2024). In contrast, SCs have demonstrated lower retention rates and durability, particularly in cases involving carious lesions on multiple surfaces, which is common amongst children at high caries risk (Alaki et al. 2020; Elheeny and Sermani 2024). Specifically, SCs exhibit lower retention and durability than both ZCs and PVP MCs (Gill et al. 2020). Relative to SCs, PVP MCs showed lower sensitivity to hemorrhage or saliva that could influence resistance, retention, or crown color, and they need less chair time (Champagne et al. 2007; Shah et al. 2004). Although ZCs demonstrate high success rates, their routine use may be limited by tooth preparation requirements, cost, and technical precision (Foster et al. 2024; Chisini et al. 2018). Although zirconia crowns excel in durability and appearance, strip crowns continue to be an affordable option for families with tight budgets (Dongarwar et al. 2025). The differences in performance between these crown types highlight the importance of selecting the appropriate restorative material based on individual patient needs and risk factors. For children susceptible to caries, ZCs may offer a more reliable solution, ensuring better longevity and fewer replacements, which can be disruptive to both the child and the treatment process (Gill et al. 2020; Walia et al. 2014).

Recent studies have increasingly focused on the clinical success of paediatric crowns after pulp treatments, emphasising the need for continued research in this field (Labbé et al. 2023; Yanover et al. 2021a, b). Furthermore, the innovative use of materials such as resin-modified glass ionomer cements in Pedo Jacket crowns offers distinct benefits, especially for uncooperative children with ECC (Castro et al. 2016).

The present study used only Web of Science, which potentially missed key studies and biased the literature identified. Citations don't equate with quality, and bibliometric data can't judge study validity; so the findings aren't suitable for clinical decisions, but the map highlights gaps and supports future primary and secondary research, including systematic and scoping reviews.

Conclusions

The evaluation of studies on restorations in anterior primary teeth highlights the effectiveness of zirconia crowns with superior durability, aesthetics, and parental satisfaction compared to other crown types. Whilst resin composite strip crowns are still a valid option, their limitations in retention

and potential aesthetic issues necessitate careful evaluation in making clinical decisions. The variety of study designs and follow-up durations highlights the need for comprehensive research to inform best practices in paediatric dentistry.

Conflict of interest

The authors declare no competing interests.

Author contributions Concept: T.T., G.E.U., Z.C.C., Design: T.T., G.E.U., Z.C.C., Data Collection or Processing: T.T., G.E.U., Z.C.C., Analysis or Interpretation: T.T., G.E.U., Z.C.C., Literature Search: T.T., G.E.U., Z.C.C., Writing: T.T., G.E.U., Z.C.C., Supervision: G.E.U., Z.C.C.

Data availability No datasets were generated or analysed during the current study.

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