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Review Article

Dentistry Section

Evaluating the Efficacy of Chewable Toothbrushes: A Scoping Review

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ABSTRACT

Introduction: The Chewable Toothbrush (CB) is a recent innovation in mechanical plaque removal methods. With its unique design, this tiny compressible brush can be used in both chewing and brushing actions without the need for toothpaste or water.

Aim: To provide an overview of the indications, contraindications, advantages, and disadvantages of CBs. Furthermore, the present study aims to summarise the current evidence on the efficacy of plaque removal compared to powered or manual toothbrushes in all age groups and in both orthodontic and non orthodontic patients. It also aims to report the evidence on the ability of CBs to prevent dental caries.

Materials and Methods: The electronic databases of 'Google Scholar,' 'PubMed,' 'Cochrane Database,' and 'Science Direct' were searched for all studies that evaluated the efficacy of CBs in removing dental plaque or controlling dental caries. The eligibility criteria included any study written in English, involving all types of populations without any restrictions. A total of 14 articles were identified and included in the present review. A data-charting form was utilised to extract relevant information from eligible studies.

Results: A review of the current published studies revealed inferior efficacy for CB compared to the powered brush, with inconsistent findings compared to the manual brush. Additionally, CB has demonstrated promising caries prevention capabilities in most studies.

Conclusion: Based on its indications, CB might be an appropriate oral hygiene tool in situations where manual toothbrushing is difficult to perform, such as in individuals with physical disabilities, reduced manual dexterity, and those who lack brushing motivation or the appropriate brushing technique. The use of CB could be beneficial in individuals with a high-risk of caries due to its unique anticaries properties. However, more research is required to confirm these findings.

Keywords: Dental caries, Dental plaque, Effectiveness, Manual toothbrushes, Mechanical plaque

INTRODUCTION

Despite being preventable, oral diseases remain a significant public health problem in many regions around the globe [1]. Based on estimates from the Global Burden of Disease Study, oral diseases, particularly untreated dental caries, have affected approximately 3.5 billion people worldwide in 2019 [1,2]. Periodontal disease, which includes gingivitis and periodontitis, is also a prevalent health condition, affecting almost 14% of adults worldwide [1,2]. Dental plaque is a biofilm that adheres to the tooth surface and the surfaces of any fixed or removable restorations inside the oral cavity [3]. It is well-established that dental plaque plays a major role in the development and progression of both dental caries and periodontal disease, as it contains aggregates of bacteria, such as anaerobic Fusobacterium and acid-producing microbes (i.e., *Streptococcus mutans*, *Candida albicans*) [3,4].

Plaque control is an efficient way to preserve oral health and prevent dental caries and periodontal disease, along with the use of fluoride in caries management [5,6]. Plaque control involves the use of mechanical methods (e.g., toothbrush, dental floss), chemical approaches (e.g., mouth rinse, dentifrices), or a combination of both to remove bacterial plaque from the teeth and the surrounding gingiva (both supragingival and subgingival areas) [6,7]. Mechanical disruption of dental plaque using a toothbrush is one of the simplest and most effective ways to maintain a healthy oral environment [7].

The major types of toothbrushes include manual and powered or electric toothbrushes. Currently, manual toothbrushes are widely used in many populations because they are inexpensive, readily available, and easy to use [8,9]. Effective toothbrushing requires patient compliance, as well as the use of appropriate brushing techniques [10]. However, using manual toothbrushes requires a certain degree of manual dexterity, making them challenging to use for many individuals, especially children and those with physical disabilities [11,12].

To overcome this challenge, powered toothbrushes were introduced in the 1960s by Frederick Wilhelm [13]. However, they are more expensive, heavier, and larger compared to manual toothbrushes [14]. Furthermore, some reported drawbacks of using powered toothbrushes include the potential to trigger epileptic seizures [15], safety issues when defectively manufactured (e.g., parts of the toothbrush breaking off at high speed, causing intra and extraoral injuries) [16], and the contamination of certain types of abrasive toothpaste with metal particles released from the replaceable brush heads, leading to allergic reactions (such as contact cheilitis) and gastrointestinal diseases if ingested [17,18].

Recent advances in dental technology have led to the introduction of a new plaque control aid called "CB." The Fuzzy Brush (Fuzzy Brush Products Ltd.) is the most well known brand of CBs, developed in the United Kingdom and later receiving FDA (Food and Drug Administration) approval in the United States in 2018 [19-21]. This disposable plastic-shaped toothbrush is advertised as being more practical than manual toothbrushes, especially for children and frequent travellers, as it does not require the use of toothpaste or water for rinsing [21]. The brush can be chewed like chewing gum since it is made of compressible elastic material [21]. Additionally, the bristles on the brush are designed in a single tuft manner [22]. Some commercially available brands are coated with fluoride and xylitol, a natural sugar-free sweetener, both known for their anticaries effects [23-25]. Various flavours are also available, including cool mint and bubblegum [26]. The unique and revolutionary feature of this type of toothbrush is its dual modes of action: brushing and chewing [22]. For the brushing action, the brush is placed between the teeth, and the tongue is used to swivel it around the mouth. Some products also include a small handle attached to the brush

for added convenience [27]. The chewing action allows the bristles to remove dental plaque from the surfaces of the teeth and the interdental areas while releasing the anticariogenic substances (xylitol or fluoride) [Table/Fig-1] [27-29].

[Table/Fig-1]: Different brands of CBs [27-29].

The efficacy of manual and powered toothbrushes in removing dental plaque has been evaluated in many studies in the current literature [30]. However, research assessing the efficacy of CBs is scarce, and to date, only one systematic review with meta-analysis by Oliveira LM et al., has evaluated their efficacy, but this was limited to a specific population (non orthodontic children) [31]. Therefore, given the importance of plaque control in maintaining a healthy oral environment, this narrative review aims to provide an overview of the indications, contraindications, advantages, and disadvantages of CBs. Additionally, it aimed to report clinical evidence on the plaque removal efficacy of CBs compared to powered or manual toothbrushes in all age groups, regardless of whether the participants are wearing an intraoral appliance. Furthermore, the review aimed to report on the evidence of the anticariogenic activity of CBs. Unlike systematic reviews, this scoping review aims to present and briefly analyse the available evidence on the efficacy of CBs in regards to dental plaque reduction and caries prevention.

MATERIALS AND METHODS

A search was conducted from July to February 2023 using the electronic databases Google Scholar, PubMed, Cochrane Database, and Science Direct to identify all studies that evaluated the efficacy of CB compared to powered or manual toothbrushes in removing dental plaque (Outcome 1) or controlling dental caries (Outcome 2) in all populations (Study Population). Regarding eligibility, only published studies written in English were considered, regardless of the publication date. In addition, to be comprehensive, studies in all types of target populations were eligible for inclusion. Therefore, the review considered studies that were conducted in systematically healthy individuals in any age group, as well as studies conducted in those with chronic conditions (e.g., diabetes mellitus) or physical limitations. Additionally, no restrictions were imposed regarding the intraoral appliance status (i.e., orthodontic and non orthodontic participants). Studies that did not evaluate either of the two outcomes of interest were excluded from the present review.

Keywords used in the search strategy included the combination of 'CB', 'efficacy', 'effectiveness', 'efficiency', 'dental plaque', 'oral health', and 'caries'. An example of a search strategy used in one of the electronic databases, Google Scholar, is: Chewable OR Toothbrush OR CB OR Fuzzy Brush OR Rolly Brush OR Efficacy OR Efficiency OR Effectiveness OR Dental plaque OR Plaque Removal OR Plaque Reduction OR Oral Health OR Oral Hygiene OR Caries OR Caries Reduction OR anticaries OR cariostatic. Reference lists were also hand-searched for potentially relevant articles. A data-charting form was developed by the author and utilised to extract relevant information from eligible studies. For each eligible study, the extracted information included the title, publication date, key characteristics of the target population, study design, sample size, and main findings of the study (including any indications or contraindications of CB, advantages and disadvantages, and assessment of efficacy regarding dental plaque reduction or caries control). A single reviewer conducted the data charting, and no protocol registration was performed for the current review. Finally, studies that investigated the efficacy of CB were presented based on different age groups (children, adults, elderly individuals). To assess the quality of the current evidence, a brief critical appraisal was conducted for those studies by inspecting different elements in the methodological approach, as well as examining the relative findings. The present manuscript was prepared following the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines for scoping reviews (PRISMA-ScR) [32].

RESULTS

A total of 18 articles were identified, of which four were excluded after careful examination due to irrelevance, as they were descriptive in nature and did not include any evaluations of CB's plaque removal or caries prevention capabilities. Additionally, the study by Myoken Y et al., could not be retrieved in full text; however, information from the available abstract is still included in this paper [33].

3.1. Indications and contraindications of Chewable Toothbrushes (CB): The use of CB is appropriate for populations of all ages, including children, adults, and elderly individuals [34]. Additionally, it might be more suitable for people with poor manual dexterity or brushing skills, and those with physical limitations (e.g., handicapped individuals, elderly people with limited mobility) [34]. CB can also be used in circumstances where toothpaste, a toothbrush, and water are not accessible [34]. CB is contraindicated in unco-operative patients, as well as in children under the age of six years and individuals with mental illnesses, due to a lack of masticatory control and to avoid the risk of accidental swallowing [10,34,35].

3.2. Advantages and disadvantages of Chewable Toothbrushes (CB): A summary of the main advantages and disadvantages of CB in comparison to other types of brushes is illustrated in [Table/Fig-2] [6,10,14,21,24-26,34,36,37].

Advantages of Chewable Toothbrushes (CB)
1-More convenient and easier to use compared to manual or powered brush, especially when traveling or after a mid-day meal [10,34].
2-Does not require the use of toothpaste [34].
3-Does not require the use of water to rinse [34].
4-The small design allows the bristles to remove dental plaque from areas that are difficult to reach when using the manual brush, such as interproximal surfaces [14] (more plaque removal was observed in the proximal tooth surfaces in a study conducted by Jeong MJ et al.,) [21].
5-The addition of fluoride and xylitol to help reduce caries reduction and teeth remineralisation [14,24,25].
6-The availability of different flavours that provide a pleasant brushing experience and help unmotivated individuals to brush [26].
7-Similar to the action of a chewing gum, using the CB might help alleviates depression and stress [36].
Disadvantages of Chewable Toothbrushes (CB)
1-Disposable after a single use (this could also be advantageous in terms of avoiding microbial contamination when compared to the manual brush) [34,37].
2-It is more expensive than the manual or powered brush, especially when used for long periods [34].
3-Safety hazard related to accidental swallowing (this is avoided in some brands by attaching dental floss to the holding tip of the brush) [6,14,34].

[Table/Fig-2]: Advantages and disadvantages of Chewable Toothbrushes (CB) [6,10,14,21,24-26,34,36,37].

3.3. Efficacy of Chewable Toothbrushes (CB): One or more of the following standardised indices were used to assess plaque removal efficacy: a) the Simplified Oral Hygiene Index (OHI-S), which assesses the amount of stains and soft debris [38]; b) the Turesky modification of the Quigley-Hein Index (TQHI or TMQHI), which assesses the amount of supragingival dental plaque [39]; c) the Silness-Loe

Plaque Index (SLPI), which assesses the thickness of supragingival dental plaque [40]; and d) the Loe and Silness gingival index, which assesses the degree of gingival inflammation [41]. Most studies compared mean differences (also known as "plaque reduction rate") [21] in the index scores before and after using different types of brushes, including CB. In this case, higher differences or rates denote greater plaque removal efficiency. On the other hand, some studies [6,20,34,42] compared mean scores, in which lower mean scores represent greater efficiency. It is noteworthy that, except for one study conducted by Govindaraju L and Gurunathan D, which only used CB in the comparisons, all of the included studies compared CB with either a manual or powered brush [34]. Therefore, the quality of the evidence from that study could be poor [34]. Similarly, the experimental trial conducted by Moreira LV et al., provides limited clinical evidence compared to other studies [42], as Moreira LV et al., analysed the pre-and postbrushing effects separately for both the chewable and manual toothbrushes.

Besides the plaque removal capability, only three studies evaluated the caries prevention ability of CBs by measuring the increase in postbrushing salivary pH levels or the salivary Streptococcus mutans counts [14,20,34]. A summary of information related to the study characteristics and the main findings for each article included in this review is illustrated in [Table/Fig-3-5] [6,10,14,20,21,33-35,42-47]. The selected articles are reported based on the target population.

Title and name of authors	Age	Year	Study design and sample size	Main findings
Comparative evaluation of plaque removal efficiency of manual, electric and Chewable Toothbrush (CB) in children: A pilot study (Aravind A et al.,) [43].	8-14 years	2018	Single-blind crossover design (n=30).	• Among the three types of brushes, the electric toothbrush was found to be the most effective in reducing dental plaque, followed by the manual brush, and the chewable brush was the least effective (QHI-S mean plaque reduction difference of 1.14 vs 0.44 vs 0.20; TQHI mean plaque reduction difference of 1.34 vs 0.58 vs 0.18; respectively). • A significant difference in plaque reduction was observed only between the electric and the manual toothbrush (TQHI mean plaque reduction difference of 0.93, p-value=0.032).
Efficacy of chewable brush compared to manual brush in school going children of age group 10 to 12 years (Keerthi T) [14].	10-12 years	2018	Single-blind crossover design (n=150).	• The CB was slightly more effective than the manual brush in reducing dental plaque (mean plaque reduction of 50.28% vs 44.86%, p-value=0.008; respectively). • The CB was also relatively more effective in preventing dental caries compared to the manual brush (mean increase in salivary pH of 11.083 vs 9.760, p-value <0.001; respectively).
How effective is a chewable brush in removing plaque in children? A pilot study (Bezgin T et al.,) [10].	10-12 years	2015	Single-blind crossover design (n=20).	• The CB was found to be as effective as the manual brush in the removal of dental plaque, with no significant differences observed (QHI-S mean plaque reduction difference of 1.31 vs 1.34, p-value=0.966; TQHI mean plaque reduction difference of 1.91 vs 1.96, p-value=0.735; respectively).
Comparative clinical evaluation of the dental plaque removing ability of chewable toothbrush vs manual toothbrush in mixed dentition period children (Lokesh S et al.,) [44].	Mean age of 8.3 years	2018	RCT (n=60) • CB (n=30). • Manual toothbrush (n=30).	• The CB was found to be as effective as the manual brush in the removal of dental plaque, with no significant differences observed (QHI-S mean plaque reduction difference of 0.22 vs 0.32, p-value=0.204; TQHI mean plaque reduction difference of 0.40 vs 0.41, p-value=0.924, SLPI mean plaque reduction difference of 0.47 vs 0.45, p-value=0.861; respectively).
Comparative evaluation of plaque removal effectiveness of manual and CB in children: A RCT (Kayalvizhi G et al.,) [6].	8-10 years	2019	Single-blind RCT (n=60) • CB (n=30). • Manual toothbrush (n=30).	• The CB was relatively more effective than the manual brush in removing the overall plaque (mean TQHI score of 0.79 vs 1.13, p-value <0.001), especially in the lingual surfaces of the teeth (mean score of 12.60 vs 28.73, p-value <0.001). • The CB was also relatively more effective than the manual brush in preventing gingival inflammation (mean Loe and Silness gingival index score of 0.09 vs 0.19, p-value=0.021).
Efficacy of rolly brush and proexpert oral B toothbrush for dental plaque removal in children (Keyhani PE et al.,) [45].	8-10 years	2018	Single-blind crossover design (n=20).	• The CB was found to be less effective in removing dental plaque compared to the manual brush (mean TQHI score of 3.37 vs 3.10, p-value <0.001), with the lowest brushing performance in the area of mandibular posterior teeth (mean TQHI score of 3.40 vs 3.08, p-value <0.001).
Plaque removal efficiency of CB among 10-12 year old Children: A Randomised Control Trial (Nekkanti S et al.,) [20]	10-12 years	2020	Single-blind RCT (n=40) • CB (n=20). • Manual toothbrush (n=20)	• The CB was found to be as effective as the manual brush in the removal of dental plaque, with no significant differences observed (mean QHI-S score of 0.90 vs 0.98, p-value=0.707; mean TQHI score of 0.63 vs 0.80, p-value=0.183; respectively). • When compared to manual brushing, the use of a CB led to a higher decrease in the number of Streptococcus mutans, with borderline significance (mean count of 1.13 vs 2.46, p-value=0.08; respectively).
Comparative evolution of clinical efficacy of manual toothbrush versus chewable toothbrush a randomised clinical trail (Reddy KS et al.,) [46].	8-12 years	2021	Double-blind RCT (n=50) • CB (n=25). • Manual toothbrush (n=25)	• The CB was found to be relatively more effective than the manual brush in the removal of dental plaque (mean QHI-S score of 1.01 vs 1.50, p-value=0.019; respectively).
Effectiveness of chewable toothbrush in children-A prospective clinical study (Govindaraju L and Gurunathan D) [34].	6-9 years	2017	Crossover design (n=10).	• Participants received only one type of toothbrush (which is the chewable brush) and comparisons were made before and after brushing. • The use of a CB resulted in a significant reduction in dental plaque (mean QHI-S postbrushing score of 0.63 vs 1.11 prebrushing, p-value <0.001; mean TQHI postbrushing score of 0.26 vs 0.70 prebrushing, p-value <0.001). • Surprisingly, the use of a CB resulted in a slightly more acidic salivary pH (mean of 7.00 vs 7.20, p-value=0.037). However, salivary Streptococcus mutans levels decreased significantly after brushing (299200.00 vs 740800.00, p-value=0.006).
Effectiveness of plaque removal with an experimental chewable brush in children between age 9 and 13 years (Joshi AV and Dixit UB) [35].	9-13 years	2018	Single-blind RCT (n=60) • CB (n=30). • Manual toothbrush (n=30)	• The CB was found to be as effective as the manual brush in the overall removal of dental plaque (TQHI mean overall plaque reduction difference of 1.13 vs 1.0, p-value=0.308; respectively). However, it was relatively more effective than manual brush in reducing plaque from the lingual surfaces, with borderline significance (TQHI mean difference in lingual plaque reduction of 1.03 vs 0.77, p-value=0.080; respectively).

[Table/Fig-3]: Articles included in this review that evaluated the efficacy of Chewable Toothbrushes (CB) in children [6,10,14,20,34,35,43-46].

Title	Age	Year	Study design and sample size	Main findings
Comparing chewable and manual toothbrushes for reducing dental plaque: A pilot study (Jeong MJ et al.,) [21]	Unknown	2017	Crossover design (n=20).	• The plaque removal efficiency was compared between chewable and manual toothbrushes, in addition to comparing participants who used rolling brushing method with those who used non rolling method. • The CB was found to be less effective in removing dental plaque compared to the manual brush in both overall and proximal areas (TMQHI reduction rate of 10.28 vs 21.32, p-value=0.002; TMQHI-proximal reduction rate of 10.48 vs 20.16, p-value=0.001; SLPI reduction rate of 7.49 vs 12.45, p-value=0.251; respectively). • In both groups using rolling and non rolling methods, the CB was found to be less effective in removing dental plaque when compared to the manual brush. However, the differences were relatively smaller and not significant in the non rolling group (rolling method: TMQHI reduction rate of 12.51 vs 27.39, p-value=0.006; TMQHI-proximal reduction rate of 12.65 vs 26.10, p-value=0.003; SLPI reduction rate of 2.77 vs 10.43, p-value=0.060; respectively/non rolling method: TMQHI reduction rate of 8.04 vs 15.25, p-value=0.131; TMQHI-proximal reduction rate of 8.31 vs 14.22, p-value=0.096; SLPI reduction rate of 12.22 vs 14.47, p-value=0.732; respectively).
Efficiency of CB in reduction of dental plaque in students (Mladenovic R et al.,) [47]	21-24 years	2019	RCT (n=35) • CB (n=18). • Manual toothbrush (n=17).	• The CB was found to be relatively more effective than the manual brush in the removal of dental plaque in the upper jaw (mean TMQHI score of 1.7 vs 2.0, p-value=0.024; respectively).
The effectiveness of apple, sugar-free chewing gum and Rolly Brush® in the reduction of plaque index: Crossover RCT (Moreira LV et al.,) [42]	18-26 years	2021	Single-blind crossover design (n=18).	• Comparisons were made before and after using the brush (for the chewable brush: mean TMQHI postbrushing score of 1.75 vs 2.02 prebrushing, p-value=0.032; for the manual brush: mean TMQHI postbrushing score of 1.31 vs 2.07 prebrushing brushing, p-value <0.001). • The CB was found to be less effective in removing dental plaque compared to the manual (mean TMQHI postbrushing score of 1.75 vs 1.31; respectively).

[Table/Fig-4]: Articles included in this review that evaluated the efficacy of Chewable Toothbrushes (CB) in adults [21,42,47].

Title	Age	Year	Study design and sample size	Main findings
Plaque removal with an experimental CB and a control manual toothbrush in a care-dependent elderly population: a pilot study (Myoken Y et al.,) [33]	Unknown	2005	Crossover design (n=14).	• The CB was found to be relatively more effective than the manual brush in the removal of dental plaque, especially on the lingual surfaces of the teeth (overall SLPI mean difference of 41.0% vs 38.8%, p-value=0.84; lingual SLPI mean difference of 68.8% vs 38.4%, p-value=0.011; respectively).

[Table/Fig-5]: Articles included in this review that evaluated the efficacy of Chewable Toothbrushes (CB) in elderly populations [33].

Overall, ten studies conducted on children were identified [Table/Fig-3] [6,10,14,20,34,35,43-46], three on adults [Table/Fig-4] [21,42,47], one on elderly individuals [Table/Fig-5] [33], and none on participants with chronic conditions or physical impairments. Of those studies, six were Randomised Clinical Trials (RCTs) (five in children [6,20,35,44,46] and one in adults [47]), and eight were crossover studies (five in children [10,14,34,43,45], two in adults [21,42], and one in elderly individuals [33]).

After excluding the experiment by Govindaraju L and Gurunathan D, the clinical evidence on the plaque removal ability of CBs was mixed [34]. Five of the included studies reported greater effectiveness compared to manual toothbrushes [6,14,33,46,47], while four studies reported equal effectiveness [10,20,35,44], and lower effectiveness was observed in the remaining four [21,42,43,45]. Most of the studies that reported higher effectiveness found CBs to be most effective in removing plaque from the lingual surfaces of the teeth [6,33,35]. Regarding anticaries activity, the use of CB resulted in a significant reduction in salivary Streptococcus counts and a favourable increase in salivary pH levels [14,20]. However, a slightly more acidic pH was observed in the study conducted by Govindaraju L and Gurunathan D, [34].

There is uncertainty about the statement made by Jeong MJ et al., that the CB can be used as a reliable replacement for the manual brush in the non rolling method due to the lack of statistical significance [21]. When the effect sizes were compared, it was evident that CB is relatively less effective than the manual brush in removing plaque in both overall and proximal areas (TMQHI reduction rate of 8.04 vs 15.25; TMQHI-proximal reduction rate of 8.31 vs 14.22; SLPI reduction rate of 12.22 vs 14.47). The study by Mladenovic R et al., made the same mistake as well [47]. However, except for the estimates in the upper and lower jaws, the estimates were almost equal in both types of brushes. Therefore, careful evaluation of the quality of evidence is necessary before making conclusive statements, especially in studies with clinical relevance.

Based on the findings, there is a dearth of information on elderly individuals, populations with chronic diseases or physical disabilities, and those who use intraoral appliances (e.g., orthodontic patients), all of which represent significant research gaps in the existing literature that need to be addressed. Randomised Clinical Trials (RCTs) provide the strongest evidence because they are least prone to confounding and bias compared to other study designs [48]. Findings from this review revealed a major lack of evidence from RCTs in the current literature (six RCT studies out of 14), especially in populations other than children. One remarkable observation is that the majority of current studies were conducted in low-income countries which typically have insufficient resources and limited access to dental care; therefore, the generalisability of the findings might be impacted [45]. Additionally, only a few studies examined the caries prevention capabilities of CBs, and the use of just salivary pH and/or salivary Streptococcus numbers may present challenges in drawing valid conclusions.

DISCUSSION

In the present review, only one study found CB to be less effective in removing dental plaque than the powered toothbrush [43]. Additionally, an almost equal number of studies reported higher (5 studies) and equal (4 studies) efficiency of CB compared to manual toothbrushing, with higher efficiency mostly in the lingual aspects of the teeth. CB was also found to be effective in reducing caries incidence by promoting a less acidic pH environment and decreasing Streptococcus mutans levels in the saliva.

It is worth noting that the currently available systematic review and meta-analysis conducted by Oliveira LM et al., included only RCTs of a very specific population (non orthodontic children), and the

authors were uncertain about the efficacy of CBs in that population, as the included studies had poor methodological quality [31]. Therefore, future large-scale, long-term follow-up empirical studies that include populations with diverse age groups and different periodontal and/or caries risk profiles, as well as comprehensive systematic reviews, are needed before making conclusive statements or recommending the use of this new generation of toothbrushes. In addition, future studies should pay more attention to the quality of their methodological approach by adhering to well known assessment criteria {e.g., Consolidated Standards of Reporting Trials (CONSORT) [49], Standard Protocol Items (SPIRIT) [50]}, as well as evaluating the efficacy of CBs using other parameters (such as anti-gingivitis efficacy). Finally, because this type of toothbrushes is designed for single use, future research should also focus on the environmental impact of these disposable brushes [51].

The current review is a scoping type of review, which has inherent limitations because it focuses on providing a broader image rather than detailed knowledge compared to systematic reviews and meta-analyses. Nevertheless, the present review will most likely be a valuable source as it highlights evidence gaps in the existing literature and identifies potential areas for future research.

CONCLUSION(S)

Based on its indications, it seems that CB could be a reliable alternative to the manual brush in situations where manual toothbrushing is difficult to perform, such as in individuals with disabilities, poor manual dexterity, and those who lack the necessary brushing skills or motivation to brush. Additionally, the use of CB could be beneficial in individuals with a high caries risk due to its unique anticaries properties. However, evidence in the current literature is lacking, and more extensive investigations with rigorous methodologies are needed to definitively determine the efficiency of this newly invented toothbrush.

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