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Original Article

Efficacy of Automatic Suction-Type Sonic Toothbrush and Manual Toothbrush in Preschool Children: A Randomized, Controlled Crossover Pilot Study

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Abstract

This study investigated the plaque removal efficacy of a suction-type sonic toothbrush compared to a conventional manual toothbrush in preschool children aged 30 to 59 months. Using a randomized, double-blind, crossover design with a 2-week washout period, 20 pediatric participants were allocated to two study phases, each using either the suction-type sonic toothbrush or the manual toothbrush with caregiver assistance. The plaque removal effectiveness was assessed through the Silness and Löe plaque index and quantitative light-induced fluorescence values, including ΔR30 and ΔR120 indicators of plaque index. The result showed no statistically significant differences in plaque removal efficacy between the two toothbrushes, although both showed similar improvements. Caregiver feedback revealed high acceptability of the suction-type sonic toothbrush due to its convenience and engaging features, such as a light and suction function, which enhanced the tooth brushing experience. Although limited by the short follow-up period and small sample size, the findings suggest that suction-type sonic toothbrushes may offer practical benefits for young children requiring caregiver assistance. [J Korean Acad Pediatr Dent 2025;52(2):181-192]

Keywords

Suction-type sonic toothbrush, Pediatric oral hygiene, Plaque removal efficacy, Quantitative light-induced fluorescence

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Introduction

Effective oral hygiene, including tooth brushing, is crucial for maintaining oral health, and is associated with the prevention of dental caries and other periodon-

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tal diseases[1]. Supervised tooth brushing suggests that these items require particular emphasis in oral health promotion programs aimed at improving early childhood oral health[2]. Education to improve children's tooth brushing behavior should be appropriate for their developmental stage[3]. In children under 6 years of age, the frequency of supervised tooth brushing is a key factor in caries risk assessment[4]. This indicates that young children, who often lack fine motor skills, should receive assistance from caregivers when brushing their teeth[5].

One commonly introduced method for tooth brushing in preschool children is the supine position, leaning on the parents' legs, where children lie down while brushing[6]. Young children are at risk of aspirating saliva and dentifrice during brushing, underscoring the importance of careful supervision and techniques when brushing their teeth[7]. Children under 6 years old are at risk of swallowing toothpaste during brushing, with 2 – 3 year-olds being particularly vulnerable, as they tend to ingest approximately 48% of the applied toothpaste[8]. Due to their lower body weight, younger children are more susceptible to absorbing higher concentrations of fluoride, and ingestion of more than 0.6 mg of fluoride per day in 2-year-olds can pose a risk of dental fluorosis. To mitigate this, it is recommended to use toothpaste with a lower fluoride content and to apply it sparingly in young children. Parents often face challenges in managing their children's behavior during tooth brushing, with common difficulties including resistance, tantrums, and refusal[9]. When children lie down, the accumulation of saliva and water causes discomfort, leading them to spit and become difficult to manage, ultimately reducing the brushing time. Parents attempt to overcome barriers to tooth brushing using specific strategies[10].

Several clinical studies have demonstrated that the use of an electric toothbrush is significantly more effective than a manual toothbrush in reducing plaque scores in children[11]. Powered toothbrushes are more effective than manual toothbrushes for plaque removal in children[12-14]. A previous study showed that using an electric toothbrush is effective for supragingival plaque removal in children aged 4 to 5 years, especially in areas that are difficult to access[15]. In addition to the plaque removal efficacy, the use of powered toothbrushes with features such as timers, lights, and sounds has proven effective in capturing children's interest[16].

A new sonic toothbrush that simultaneously removes water and saliva during brushing was introduced. This design allows caregivers to assist with oral hygiene with minimal effort, potentially contributing to improved oral hygiene during the primary dentition stage. The toothbrush was capable of suctioning up to 500 mL of water and saliva per minute, which was collected in a foldable container for easy disposal. It operates at 14,000 sonic vibrations per minute, ensuring thorough tooth cleaning. This device is particularly beneficial for individuals who have difficulty in spitting out, such as infants, young children, patients, the elderly, and individuals with disabilities.

Quantitative light-induced fluorescence (QLF) is primarily used to detect early carious lesions[17]. It employs visible light at 405 nm to differentiate and quantify these lesions by assessing the natural fluorescence emitted from healthy dental tissue versus demineralized areas. Additionally, QLF detects the red fluorescence produced by porphyrin, a metabolic byproduct secreted by oral bacteria[18]. This technique enables the evaluation of dental plaque without the need for plaque-staining agents, with older dental plaques exhibiting increased red fluorescence, which can be quantified using a simple plaque score.

The Qraycam (AIOBIO, Seoul, Korea) is a device that employs the principles of QLF to capture quantitative fluorescence images. It measures the ratio of red fluorescence area and the degree of fluorescence loss utilizing dedicated analysis software. By employing diagnostic indicators such as ΔR and ΔR max, it enables the quantification of bacterial activity associated with the onset of dental carious lesions.

This study aimed to compare the plaque removal efficacy of a suction-type sonic toothbrush with that of a conventional manual toothbrush in children aged 30 to 59 months. Oral hygiene was evaluated using QLF imaging captured with a Qraycam, and dedicated analysis software was used to measure fluorescence loss as an indicator of oral hygiene.

Materials and Methods

1. Study design

This single-center, double-blind, randomized, crossover clinical study was conducted on healthy volunteers. The test toothbrush was an suction-type sonic toothbrush (Bluereo G100, Bluereo, Seoul, Korea), compared to a conventional commercially available toothbrush (Amway Glister™ toothbrush, Amway®, Seoul, Korea) (Fig. 1).

2. Ethics aspects

The protocol was approved by the Institutional Review Board (IRB) of Kyung Hee University Dental Hospital (IRB no.: KH-DT23001).

3. Study population

Patients who visited the Department of Pediatric Dentistry, Kyung Hee University Dental Hospital between May 1, 2023, and October 31, 2023, and were aged 30 – 59 months. Each patient was asked to participate in the study after being provided with comprehensive written and verbal information by one of the researchers, outlining the study's details, including any potential risks and benefits. The consent form was explained verbally to the patients, and legal guardians signed the form to provide their consent. Participants were included if they met the specified inclusion and exclusion criteria and signed an informed consent form. Participants were excluded from the study if they used only one of the two assigned toothbrushes, if portable Q-ray images were missing during the four required visits, or if they did not meet the prescribed frequency or duration of tooth brushing per day.

Fig. 1. Photographs of manual toothbrush (A) and suction-type sonic toothbrush (B).

1) Inclusion criteria

- Pediatric patients aged 30 to 59 months whose caregivers assist with tooth brushing.
- Patients without oral lesions or untreated carious teeth requiring treatment.
- Patients and caregivers who consent to participate in the study.

2) Exclusion criteria

- Patients who brush their teeth entirely by themselves.
- Patients with a maximum mouth opening of less than 3 cm or those who have difficulty with voluntary mouth opening.

Of the 40 subjects screened, 20 were randomly assigned to treatment sequences using a computer-generated randomization list. 10 participants were allocated to the AB sequence, while the remaining 10 were assigned to the BA sequence (where A represents the manual toothbrush, and B represents the suction-type sonic toothbrush). All randomized participants completed the study as illustrated in the flowchart (Fig. 2). The participants had a mean age of 49.2 months, and the majority were boys. Table 1 presents the baseline characteristics of the sample for the overall group and for each treatment sequence. No significant differences were found in demographic or baseline clinical characteristics between the two groups.

5. Study visits and interventions

1) Day 1: first round, baseline visit

A single examiner evaluated all subjects using the Silness and Löe plaque indices (SL) and captured the QLF photographs. Following this, the participants were

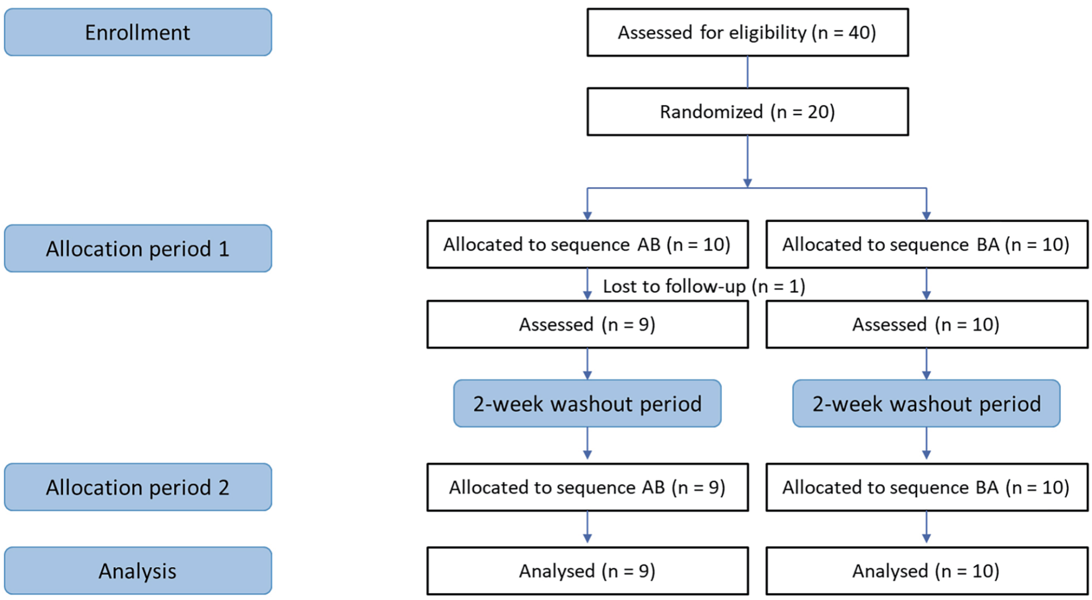

Fig. 2. CONSORT flow chart for the crossover trial. A: manual toothbrush; B: suction-type sonic toothbrush.

Table 1. Demographic variables for subjects in each sequence of the sample

	Total	AB Sequence (n = 10)	BA Sequence (n = 10)	All (n = 20)
Age (month)	Mean (SD)	50.2 (5.7)	48.2 (6.5)	49.2 (6.2)
	Max	59	60	60
	Min	41	35	35
Sex	Male	6	5	11
	Female	4	5	9

AB sequence: Participants use the suction-type sonic toothbrush (A) for the first 2-week period, followed by a 2-week washout period, and then switch to the manual toothbrush (B) for the second 2-week period.
BA sequence: Participants use the manual toothbrush (B) for the first 2-week period, followed by a 2-week washout period, and then switch to the suction-type sonic suction toothbrush (A) for the second 2-week period.

randomly assigned to use either the test or control toothbrush and received detailed instructions on its use. The examiner then supervised a single tooth brushing session, during which the participants brushed for 2 minutes using a sodium fluoride toothpaste containing 1450 ppm fluoride ions (AIOBIO KID I, AIOBIO). Afterward, each subject was provided with their assigned toothbrush and instructed to use it exclusively with the same dentifrice for 1 week without incorporating any other oral hygiene practices. The instructions were supplemented with a detailed information sheet.

2) Day 15: first round, final visit

Two weeks after the baseline visit, all participants returned to the clinical research center for a second visit in the first round. During this visit, the same examiners reassessed the plaque levels using the SL and obtained QLF photographs.

3) Washout period

Given the crossover design of the study, a 2-week washout period was implemented between the two study phases (Fig. 3). Following this interval, the same procedure was repeated to evaluate the alternative toothbrush, with each participant serving as their own control.

4) Day 29: second round, baseline visit

The same process was used for the evaluation of the other toothbrush.

5) Day 43: second round, final visit

The same process was used to evaluate the other toothbrushes. Subsequently, the participants were provided with a questionnaire to assess their acceptance and satisfaction with the toothbrush they had used.

6. Clinical outcome variables

SL were used to assess both the soft and mineral deposits on the teeth. Each of the four tooth surfaces–mesiobuccal, midbuccal, distobuccal, and midlingual– was scored individually on a scale of 0 to 3. The scores were then summed and averaged for analysis. The following grades and interpretations were applied to the resulting scores:

Grade 0: No plaque.

Grade 1: Accumulation of plaque in the free margins of the gums and lateral parts of the tooth (existing plaque may only be detected using a probe).

Grade 2: Moderate accumulation of soft deposits in the gingival pocket or on the teeth and gingival margin, which can be seen with the naked eye.

Grade 3: Frequency of soft accumulation in the gingival envelope or on the teeth and gingival margins.

7. QLF analysis

The Qraycam (AIOBIO) employs the principles of QLF to capture quantitative fluorescence images. Utilizing dedicated analysis software, it provides measurements, such as the ratio of the red fluorescence area and the degree of fluorescence loss. By employing diagnostic indicators such as ΔR and ΔR max, it enables the quantification of bacterial activity associated with the onset of dental carious lesions.

A Qraycam, which utilizes the principles of QLF, was used to assess the level of dental plaque formation (Fig. 4). White-light and fluorescent images captured by the Qraycam were analyzed using dedicated software to extract ΔR values (Fig. 3). The ΔR120 and ΔR30 values indicate the intensity and maturity of the dental plaque.

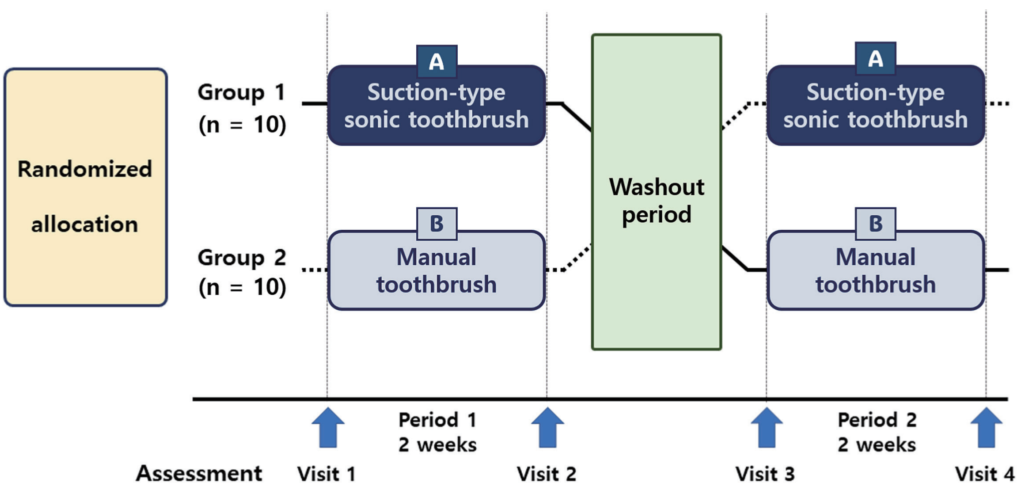

Fig. 3. Study design illustrating the randomized-controlled crossover pilot trial comparing the plaque removal efficacy of a suction-type sonic toothbrush and a manual toothbrush. Twenty participants were randomly allocated into two groups (n = 10 each). Group 1 used the suction-type sonic toothbrush during Period 1 (2 weeks), while Group 2 used the manual toothbrush. After the first 2-week period, all participants underwent a washout period. During Period 2 (2 weeks), the groups switched toothbrushes. Oral hygiene assessments were conducted at four time points.

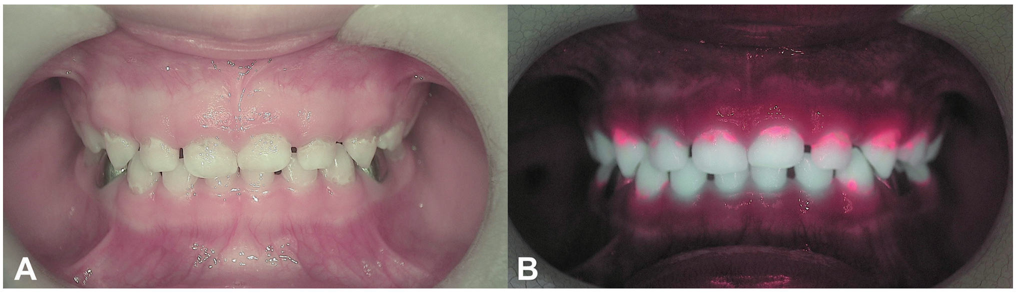

Fig. 4. (A) Normal and (B) Quantitative light-induced fluorescence images demonstrate the plaque accumulation in fluorescence levels.

After drying the tooth surfaces, images of the labial surfaces of the anterior teeth in central occlusion were captured using a Qraycam to obtain the relevant data.

The ΔR30 and ΔR120 values from the fluorescent images obtained through QLF were automatically calculated using a proprietary analysis program (Q-ray version 1.24, Inspektor Research Systems BV, Seoul, Korea). ΔR30 and ΔR120 represent the areas of red fluorescent plaque corresponding to pixels with fluorescence losses exceeding 30% and 120%, respectively, according to a specific algorithm. ΔR30 quantifies the red fluorescence emitted from teeth or periodontal tissues, which serves as an indicator of bacterial activity, while ΔR120 reflects regions where bacterial activity is more pronounced.

8. Patient-reported outcome measures

At the end of the study period, each participant completed a standardized questionnaire designed to assess perceptions, ease of use, and adverse effects (Table 2).

9. Data analysis

1) Sample size calculation

Using G*Power (version 3.1.9.4), the required sample size was calculated with a power of 0.80, an alpha level of 0.05, and an effect size of 0.5. The results indicated that nine participants were required per group. Considering a 10% dropout rate, we planned a crossover design with 10 participants per group, resulting in a total of 20 participants.

2) Statistical analysis

Statistical tests were conducted using the SPSS software (version 25.0; SPSS Inc., Chicago, IL, USA). For continuous variables, a paired-sample t test was carried out on each variable to make a comparison between before and after tooth brushing. Statistical significance was set at $\alpha = 0.05$.

Table 2. Patient-reported outcome measures form

Question	Score				
	5	4	3	2	1
Q1) When using a suction-type sonic toothbrush, were you able to effectively remove saliva or toothpaste?					
Q2) Do you think your child's oral hygiene has improved since using a suction-type sonic toothbrush?					
Q3) Was it easier to use a suction-type sonic toothbrush compared to a regular toothbrush?					
Q4) When using a suction-type sonic toothbrush, was your child able to brush their teeth well without being scared?					
Q5) Will you still use the suction-type sonic toothbrush after the study ends?					
Q6) If you have any other comments you would like to share, please write them below.					

Results

1. Clinical outcome variables

No carry-over or period effects on the clinical variables were found (Table 3, 4, $p > 0.05$).

Reductions in SL were observed between the baseline (Fig. 5) and final visits for suction-type sonic toothbrushes (Table 5, $p = 0.030$). A statistically significant reduction was observed in SL for the for suction-type sonic suction toothbrush group, with a mean reduction of 0.316 ± 0.582 ($p = 0.030$) from baseline to the final visit. In contrast, the manual toothbrush group showed a less significant reduction of 0.00 ± 0.816.

Table 3. Calculations for testing carry-over effect of the crossover trial based on the clinical variables

Variable	Group	n	Mean	SD	*p* value
SL	AB	9	0.00	0.50	0.168
	BA	10	0.40	0.70	
ΔR30	AB	9	0.56	3.32	0.359
	BA	10	2.60	5.85	
ΔR120	AB	9	1.00	2.78	0.813
	BA	10	1.30	2.63	

p value from independent samples t-test.
SL: Silness and Löe index; ΔR30: Area with a 30% increase in red fluorescence intensity compared to the normal tooth surface fluorescence; ΔR120: Area with a 120% increase in red fluorescence intensity compared to the normal tooth surface fluorescence.

Table 4. Calculations for testing period effect of the crossover trial based on the clinical variables

Variable	Period	n	Mean	SD	*p* value
SL	Period 1	19	0.95	0.81	0.578
	Period 2	19	0.21	0.63	
ΔR30	Period 1	19	1.95	5.77	0.938
	Period 2	19	1.63	4.81	
ΔR120	Period 1	19	2.95	0.63	0.163
	Period 2	19	1.16	2.63	

p value from paired samples t-test.
SL: Silness and Löe index; ΔR30: Area with a 30% increase in red fluorescence intensity compared to the normal tooth surface fluorescence; ΔR120: Area with a 120% increase in red fluorescence intensity compared to the normal tooth surface fluorescence.

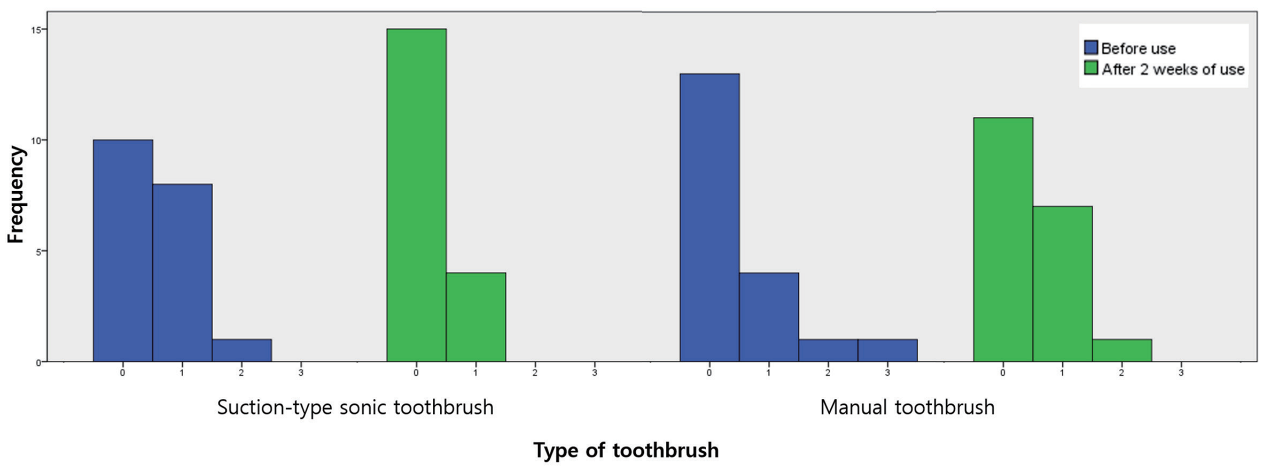

Fig. 5. Silness and Löe index of before and after 2 weeks of use for both toothbrush types.

Table 5. Silness and Löe index, ΔR30 and ΔR120 analysis with the paired t-test

	Toothbrush Type	Pre-brushing		Post-brushing		Reduction		*p* value
		mean	SD	mean	SD	mean	SD	
Silness and Löe index	Suction-type sonic Toothbrush	0.530	0.612	0.210	0.419	0.316	0.582	0.030*
	Manual Toothbrush	0.470	0.841	0.470	0.612	0.000	0.816	1.000
ΔR30	Suction-type sonic	4.16	6.10	2.89	4.51	1.26	4.43	0.230
	Manual Toothbrush	4.42	6.01	4.16	6.93	0.26	6.15	0.854
ΔR120	Suction-type sonic	1.84	2.95	1.16	2.52	0.68	2.06	0.164
	Manual Toothbrush	2.37	3.83	1.95	3.26	0.42	2.57	0.484

p value from paired t-test.
ΔR30: Area with a 30% increase in red fluorescence intensity compared to the normal tooth surface fluorescence; ΔR120: Area with a 120% increase in red fluorescence intensity compared to the normal tooth surface fluorescence.

2. QLF outcome variables

At baseline, no statistically significant differences were observed between the test and control toothbrushes for ΔR30 and ΔR120 (Fig. 6, 7), with mean ΔR30 values of 1.263 ± 4.433 for the for suction-type sonic toothbrush and 0.263 ± 6.154 for the manual toothbrush. Similarly, the mean ΔR120 values were 2.056 ± 0.164 and 2.567 ± 0.484, respectively (Table 5).

3. Patient-reported outcome measures

Table 6 shows the mean scores of the items evaluated for suction-type sonic toothbrush ratings on a scale of 1 to 5. In particular, the subjects evaluated the reduction in fear of use and sustainability of use as satisfactory. In contrast, the suction ability was evaluated with varying responses (Table 6).

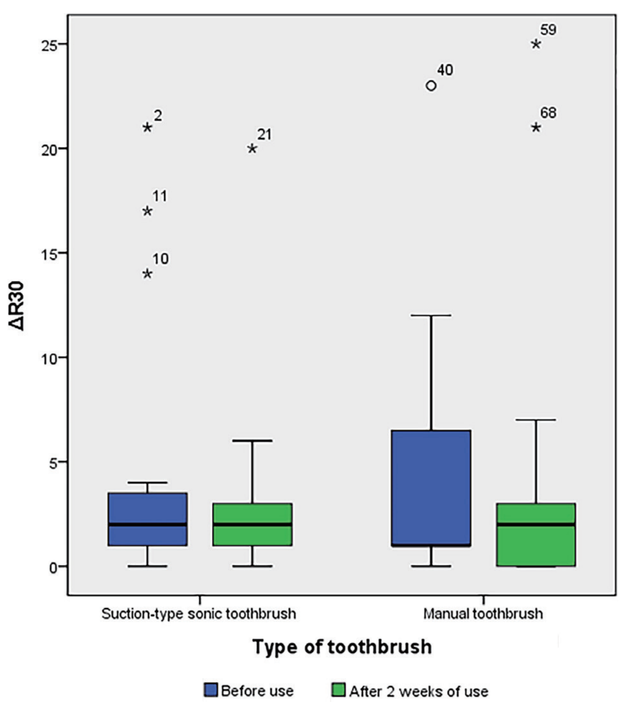

Fig. 6. ΔR30 values measured by QLF before and after 2 weeks of use for both toothbrush types.

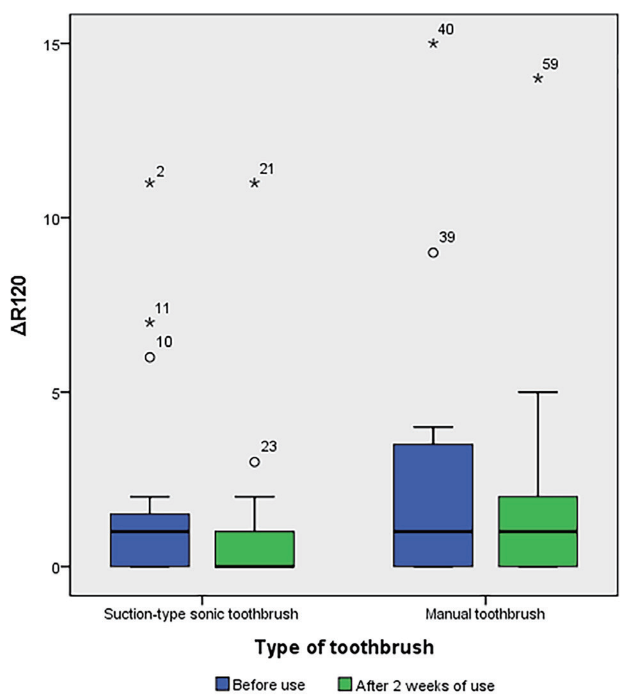

Fig. 7. ΔR120 values measured by QLF before and after 2 weeks of use for both toothbrush types.

Table 6. Mean, standard deviations, and median for the scores of the items assessed for suction-type sonic toothbrushes (patient-reported outcome measures). The answers were provided on a scale of 1 – 5

	mean	SD	median
Suction quality	3.6	1.1	4.0
Oral hygiene improvement	3.9	1.0	4.0
Easy to use	3.6	1.2	3.5
No fear of use	4.3	1.0	5.0
Continued use	4.1	1.1	4.0

Discussion

The results of this study indicated that the plaque removal efficacy of the new suction-type sonic toothbrush was not significantly different from that of the conventional toothbrush. No notable differences were found regardless of the type of toothbrush used. Our findings, based on SL and Qraycam measurements, suggest comparable plaque removal efficacy between the suction-type sonic toothbrush and the manual toothbrush, reinforcing that proper brushing technique remains critical. The participants reported no adverse effects associated with either toothbrush and expressed satisfactory evaluations of the efficiency and effectiveness of the test toothbrush.

The innovative functionality of this toothbrush allows direct comparisons between suction-type sonic toothbrushes and other types of toothbrushes. A study comparing a three-headed toothbrush with a conventional toothbrush in children found no significant difference in overall plaque removal between the two[19]. However, significant improvements in plaque removal were achieved when proper tooth brushing instructions were followed, regardless of the toothbrush design. These findings emphasize the importance of appropriate brushing techniques for effective oral hygiene in children. Nieri et al. demonstrated that a U-shaped automatic electric toothbrush was significantly less effective in reducing dental plaque than a conventional powered toothbrush and habitual tooth brushing procedure, with no significant advantage over no brushing at all[20]. Schnabl et al. demonstrated that the "ten seconds" auto-cleaning device was ineffective in reducing plaque compared to uninstructed manual tooth brushing, suggesting the need for improvements in bristle alignment and density[21].

In this study, we aimed to test the safety of a suction-type sonic toothbrush in pediatric patients, a device that has not been previously tested in this population. This exploration was part of an assessment of the feasibility and safety of younger users with specific healthcare needs. A study exploring the use of a suction-powered electric toothbrush in adults with dysphagia found that its effectiveness in maintaining oral hygiene was similar to that of a regular manual toothbrush[22]. However, the suction toothbrush group had a significantly lower incidence of pneumonia than the manual toothbrush group. This finding is crucial because aspiration pneumonia is a major risk factor in individuals with swallowing difficulties. Although oral hygiene care showed no significant differences between the two toothbrush types, the suction-powered device demonstrated superior outcomes in terms of reducing pneumonia occurrence.

Another aim of this study was to assess the acceptability of the device. Because we were unable to directly gauge the children's acceptance, feedback was collected through questionnaires completed by their caregivers, which resulted in a satisfaction score of 4.3 out of 5. Given the characteristics of pediatric patients, we considered the possibility that some children might exhibit fear or discomfort due to the vibrations or sounds of the suction-type sonic toothbrush. Three caregivers reported a positive effect, noting that the suction feature made the brushing experience resemble a playful water activity. Additionally, two caregivers mentioned that the toothbrush's light features helped increase their children's interest in brushing. Only one caregiver noted that the sound of the toothbrush caused discomfort in the child.

In this study, we evaluated the effectiveness of plaque removal in pediatric patients using the SL, along with ΔR30 and ΔR120 values obtained through Qraycam, based on the principles of QLF. Although all three indicators showed a reduction in plaque levels, the decrease was not statistically significant. Previous studies have examined the utility of QLF-based measurements for assessing the plaque removal effectiveness, suggesting their potential for clinical applications[23,24]. Notably, red fluorescence has been shown to correlate with biofilm maturation and thickness, highlighting the importance of early detection in plaque management[25]. Moreover, compared to traditional indices such as the Turesky modified Quigley Hein and SL, the QLF method demonstrated excellent reliability and fair validity, suggesting its value as a tool for detecting and evaluating dental plaques in clinical settings[26].

This crossover study incorporated a washout period to reduce variability and control for factors such as brushing technique and frequency, ensuring consistency across the study. In particular, clinical studies involving pediatric patients who are unable to brush independently may be affected by the caregiver's brushing proficiency and the child's level of cooperation[27]. Caregivers received brushing instructions at the beginning of the study, including guidance on proper brushing techniques, frequency, and duration, to ensure consistency across the study.

Numerous studies have compared the efficacy of sonic and manual toothbrushes in children under the age of 6 years. However, most of these studies involved children brushing on their own, with few focusing on instances where caregivers assisted with brushing[28]. Davidovich et al. compared the plaque removal efficacy of electric and manual toothbrushes in children aged 3 to 6 years during the primary dentition stage with tooth brushing performed by caregivers[29]. Similar to our study, their research included a comparable age group and involved caregivers brushing their children's teeth. The results demonstrated the statistically significant plaque removal efficacy of the electric toothbrush, suggesting that the brush design may help overcome the challenges faced by caregivers during brushing. However, a direct comparison with our study may be difficult because of the differences in the toothbrush model used and the plaque analysis index applied. Further investigations are required to understand the factors contributing to the superior plaque removal efficacy observed in the present study.

The patient-reported outcome measures provided valuable insights into the user experience of the suction-type sonic toothbrush. Overall, participants expressed satisfaction with the sustainability of use, suggesting that the innovative features of the toothbrush, such as its user-friendly design, may contribute to increased comfort and long-term adherence, particularly in pediatric patients. Previous studies have demonstrated that incorporating features like lights, sounds, or timers into dental devices can significantly enhance user compliance, supporting the potential of this toothbrush to encourage sustained usage[16]. Additionally, responses to our study's questionnaire revealed that the suction function of the toothbrush captured the interest of children, as noted by seven participants. However, the variability in responses regarding suction ability suggests room for improvement in the device's performance. Some participants may have experienced difficulty achieving optimal suction during brushing, potentially affecting their overall satisfaction. Addressing this variability in future iterations of the toothbrush could enhance user experience and ensure consistent functionality.

This study has several limitations. First, this study was conducted with a relatively small sample size in a controlled environment, which may limit the generalizability of the results. Future research with a larger and more diverse population is needed to confirm these findings and explore the broader applicability of the results. Second, the short duration of the study (2 weeks per treatment) may not fully capture long-term effects on plaque removal and oral health. Longer-term studies are necessary to validate the findings and assess sustained efficacy. Lastly, while the suction-type sonic toothbrush used in the study demonstrated advantages in preventing aspiration and reducing the risk of fluoride ingestion, it also has a potential drawback. Specifically, the suction mechanism may reduce the retention time of fluoride in the oral cavity, potentially diminishing its cariostatic effect. Future studies should investigate the optimal balance between suction speed and fluoride retention to maximize the toothbrush's benefits without compromising fluoride efficacy.

Within the limitations of this study, we compared the plaque removal efficacy of a suction-type sonic toothbrush with that of a manual toothbrush. Factors such as the small sample size, arbitrarily set brushing times, use of toothpaste, and short follow-up period may have affected the ability to fully evaluate the differential efficacy of the tested toothbrushes. Additionally, direct comparisons with previous studies are difficult owing to differences in study design. However, the significance of this study lies in demonstrating that a suction-type sonic toothbrush may help achieve adequate oral hygiene in pediatric patients who require caregiver assistance during brushing. Future studies with larger sample sizes, longer brushing durations, and different types of toothbrushes are required to better understand the clinical effectiveness of suction-type sonic toothbrushes.

Conclusion

This study compared the plaque removal efficacy of suction-type sonic toothbrushes and conventional manual toothbrushes in preschool children. The results indicated no statistically significant differences between the two toothbrush types, although both showed an improvement in plaque reduction. The innovative suction feature of the sonic toothbrush was well received by the caregivers, contributing to its ease of use and positive feedback, especially regarding its playful nature and light features. While this study demonstrated the potential of suction toothbrushes in maintaining oral hygiene in young children, the short follow-up period and small sample size limited the ability to draw broader conclusions. Further research with a larger sample size and longer study duration is necessary to fully evaluate its clinical effectiveness. Overall, the suction toothbrush holds promise for use in pediatric patients requiring caregiver assistance.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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