

Parental knowledge, attitudes and practices on children's toothbrushing and oral hygiene: A cross-sectional study

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Abstract

Background: Parents play a crucial role in establishing oral hygiene practices during early childhood. Their knowledge and attitudes significantly influence children's brushing habits, use of fluoridated toothpaste, and adoption of appropriate toothbrushing techniques. Despite increasing awareness, gaps often exist between parental knowledge and implementation of recommended oral hygiene practices.

Aim: To assess parental knowledge, attitudes, and practices regarding toothbrushing techniques and oral hygiene habits among children aged 3–6 years.

Materials and Methods: A cross-sectional questionnaire-based survey was conducted among parents/caregivers of children aged 3–6 years attending KVG Dental College and Hospital, Sullia. A validated bilingual questionnaire comprising 15 closed-ended questions was used to assess oral hygiene practices, parental awareness, and attitudes toward toothbrushing techniques. Data from 106 completed questionnaires were analyzed using descriptive statistics and Pearson's Chi-square test.

Results: Among the participants, 50% reported that their children brushed once daily and 50% brushed twice or more daily. Most children exhibited reluctance toward brushing (73.6%). Manual toothbrushes (89.6%) and fluoridated toothpaste (66.0%) were commonly used. Awareness regarding fluoride in caries prevention was reported by 70.8% of parents, while 67.9% were aware that circular brushing is recommended for children. Significant associations were observed between fluoride awareness and use of fluoridated toothpaste ($\chi^2=29.13$, $p<0.001$), awareness of circular brushing and its practice ($\chi^2=12.45$, $p<0.001$), and dentist demonstration with awareness of brushing techniques ($\chi^2=16.70$, $p<0.001$).

Conclusion: Parents demonstrated moderate-to-good awareness regarding oral hygiene practices; however, a gap existed between knowledge and implementation. Professional guidance and targeted parental education programs may improve oral hygiene behaviors and promote better oral health outcomes among children.

Keywords: Parental awareness, oral hygiene, toothbrushing techniques, fluoridated toothpaste, preventive dentistry, knowledge, attitude, practice

Introduction

Oral health is an essential component of general health and significantly influences a child's overall well-being, growth, development, and quality of life. The preschool years represent a critical period during which lifelong oral hygiene habits are established. During this stage, children are highly dependent on their parents or caregivers for maintaining oral hygiene and adopting preventive health behaviors. Therefore, the oral health practices implemented during early childhood often have long-term implications for future oral health outcomes [10].

Despite considerable advances in preventive dentistry, dental caries remains one of the most prevalent chronic diseases affecting children worldwide [13]. Early Childhood Caries (ECC) continues to be a major public health concern due to its high prevalence and potential consequences, including pain, infection, difficulty in eating and speaking, impaired growth, poor school performance, and reduced quality of life [6, 7]. Untreated dental caries can also increase the need for extensive dental treatment and impose a significant economic burden on families and healthcare systems [10, 13].

The prevention of ECC largely depends on the establishment of appropriate oral hygiene practices from an early age. Regular toothbrushing with fluoridated toothpaste

is recognized as one of the most effective and economical methods for maintaining oral health and preventing dental caries [6, 8, 9]. Current recommendations advocate twice-daily toothbrushing with fluoridated toothpaste, appropriate dietary practices, and regular dental visits as key preventive measures. However, successful implementation of these recommendations depends largely on parental knowledge, attitudes, and practices regarding oral healthcare [6].

Parents serve as the primary decision-makers in matters concerning their children's health. They determine when oral hygiene practices are initiated, select oral hygiene aids, supervise brushing activities, regulate dietary habits, and influence healthcare-seeking behaviors. Consequently, parental awareness plays a pivotal role in preventing oral diseases and promoting healthy oral habits. Children whose parents possess adequate knowledge regarding oral hygiene practices are more likely to adopt appropriate brushing habits and maintain better oral health [11, 12, 15].

Conversely, inadequate parental awareness may adversely affect children's oral health. Lack of knowledge regarding proper brushing techniques, fluoridated toothpaste, dietary practices, and the importance of early dental visits may compromise preventive efforts and increase the risk of dental caries. Even when oral hygiene practices are performed regularly, incorrect techniques or inadequate

supervision may reduce their effectiveness. Therefore, parental awareness is not only important for initiating oral hygiene measures but also for ensuring their appropriate implementation.

In recent years, increasing emphasis has been placed on parental involvement as a key component of preventive pediatric dental care. Educational interventions, anticipatory guidance, and behavior modification strategies have demonstrated the potential to improve parental awareness and facilitate positive oral health behaviors among children [21, 22] Nevertheless, evidence suggests that gaps continue to exist between parental knowledge and the practical implementation of recommended oral hygiene measures. Such gaps may limit the effectiveness of preventive programs and contribute to the persistence of oral diseases during childhood [23].

Assessment of parental knowledge, attitudes, and practices is therefore essential for identifying deficiencies in awareness, understanding behavioral barriers, and designing targeted educational interventions. Evaluating parental awareness regarding toothbrushing techniques is particularly important because proper brushing habits established during the preschool years can significantly influence oral health outcomes later in life.

Although several studies have assessed parental awareness regarding children's oral health, limited information is available regarding parental knowledge, attitudes, and practices related specifically to toothbrushing techniques among preschool children in the local population. Therefore, the present study was undertaken to assess parental knowledge, attitudes, and practices regarding toothbrushing techniques and oral hygiene habits among children aged 3–6 years. The findings may provide valuable information for developing evidence-based oral health education programs aimed at improving oral hygiene behaviors and preventing oral diseases among children.

Aim

To assess parental knowledge, attitudes, and practices regarding toothbrushing techniques and oral hygiene habits among children aged 3–6 years.

Objectives

1. To evaluate oral hygiene practices followed by children as reported by their parents or caregivers.
2. To assess parental awareness regarding fluoridated toothpaste and recommended toothbrushing techniques.
3. To determine the prevalence of circular brushing practices among children.
4. To evaluate parental attitudes toward oral health education and modification of brushing habits.
5. To identify the need for further parental education regarding proper toothbrushing techniques and oral hygiene maintenance.

Materials and Methods

A cross-sectional questionnaire-based survey was conducted among parents and primary caregivers of children aged 3–6 years attending the Department of Pediatric and Preventive Dentistry, KVG Dental College and Hospital, Sullia, Karnataka, India, over a period of one month. The study aimed to assess parental knowledge, attitudes, and practices

regarding toothbrushing techniques and oral hygiene habits among children. A total of 106 participants who met the eligibility criteria and provided informed consent were included in the study. Data were collected using a validated and reliable bilingual questionnaire developed after an extensive review of the literature on parental awareness, oral hygiene practices, and toothbrushing techniques in children. The questionnaire consisted of 15 close-ended questions assessing knowledge regarding fluoridated toothpaste and brushing techniques, attitudes toward oral health education, and oral hygiene practices followed by children. The questionnaire was converted into a Google Forms format and distributed electronically to parents and caregivers. Participation was voluntary, and responses were collected anonymously to ensure confidentiality and minimize response bias. Completed responses were downloaded and entered into Microsoft Excel for analysis. Descriptive statistics were used to summarize the data, and results were expressed as frequencies and percentages. Associations between selected knowledge and practice variables were evaluated using Pearson's Chi-square test, with the level of statistical significance set at $p < 0.05$.

Inclusion Criteria

- Parents or primary caregivers of children aged 3–6 years.
- Participants willing to provide informed consent.
- Participants able to understand and complete the questionnaire.

Exclusion Criteria

- Incomplete questionnaires.
- Duplicate responses.
- Parents unwilling to participate.

Questionnaire Development and Validation

A structured bilingual questionnaire was developed after an extensive review of the published literature on parental awareness, oral hygiene practices, and toothbrushing techniques among children. The questionnaire was designed to assess three major domains, namely parental knowledge, attitudes, and practices related to children's oral hygiene maintenance and brushing techniques. Content validity was established through evaluation by a panel of experts in Pediatric and Preventive Dentistry, who assessed the relevance, clarity, and comprehensiveness of the questionnaire items. Based on their recommendations, necessary modifications were incorporated to improve content accuracy and face validity. The finalized questionnaire was subsequently pilot tested on a small group of participants who were not included in the final study sample to assess comprehensibility and feasibility. Reliability of the questionnaire was evaluated using internal consistency analysis, which demonstrated acceptable reliability for use in the study. The final questionnaire consisted of 15 close-ended questions pertaining to oral hygiene practices, awareness regarding fluoridated toothpaste, knowledge of recommended brushing techniques, parental attitudes toward oral health education, and willingness to adopt improved oral hygiene practices for their children.

Inference: Manual toothbrushes were predominantly used (89.6%). Although fluoridated toothpaste was used by most children (66.0%), one-third continued to use non-fluoridated toothpaste, indicating scope for improving parental awareness regarding fluoride use.

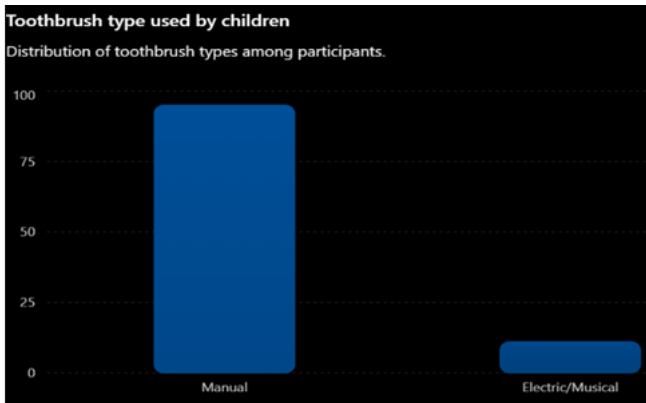


Fig 1: Toothbrush Type Used by Children

Inference: Manual toothbrushes were overwhelmingly preferred compared to electric or musical toothbrushes.

Table 3: Parental Awareness Regarding Oral Hygiene Practices

Variable	Yes n (%)	No n (%)
Aware fluoride prevents dental caries	75 (70.8)	31 (29.2)
Aware circular brushing is recommended	72 (67.9)	34 (32.1)
Heard about different brushing techniques	56 (52.8)	50 (47.2)

Inference: Awareness regarding fluoride and recommended circular brushing techniques was relatively high (>65%). However, awareness regarding specific brushing techniques remained moderate.

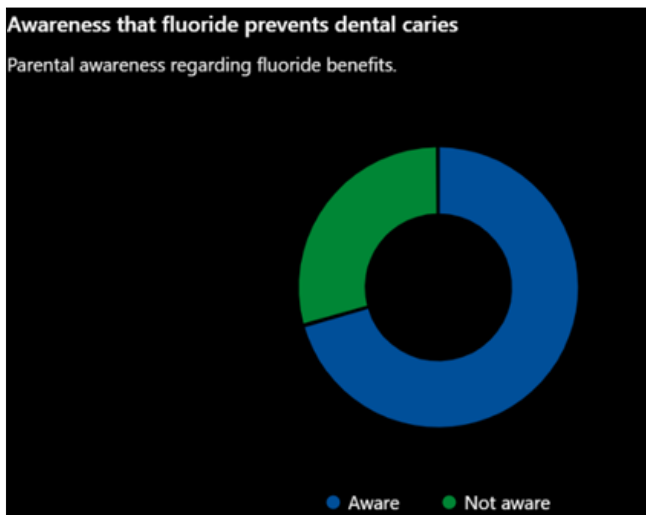


Fig 2: Awareness Regarding Fluoride

Inference: More than two-thirds of parents were aware of the preventive role of fluoride in dental caries.

Table 4: Brushing Technique Practices Among Children

Variable	Category	Frequency (n)	Percentage (%)
Child uses circular brushing motion	Yes	59	55.7
	No	47	44.3
Circular brushing perceived as superior	Yes	83	78.3
	No	23	21.7

Inference: Although most parents believed circular brushing to be more effective than other methods, only slightly more than half reported that their children actually practiced circular brushing. This finding suggests a gap between parental knowledge and practical implementation.

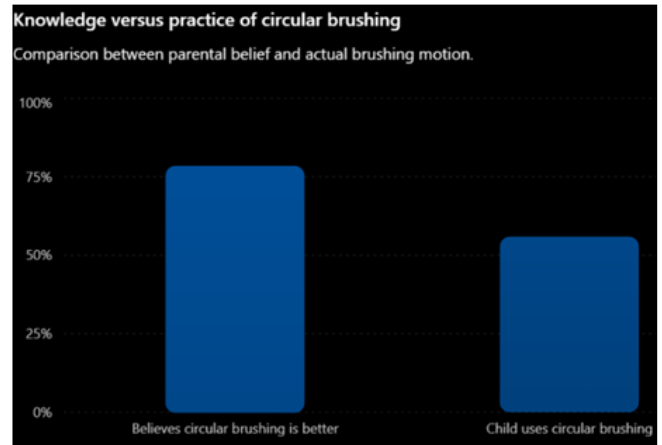


Fig 3: Knowledge-Practice Gap Regarding Circular Brushing

Inference: A substantial discrepancy exists between parental knowledge and implementation of circular brushing practices among children.

Table 5: Parental Attitude Toward Oral Health Education

Variable	Yes n (%)	No n (%)
Willing to modify child's brushing method	84 (79.2)	22 (20.8)
Dentist demonstrated brushing technique	53 (50.0)	53 (50.0)
Interested in receiving additional information	89 (84.0)	17 (16.0)

Inference: Parents demonstrated highly positive attitudes toward oral health education. The majority were willing to modify their child's brushing practices and expressed interest in obtaining additional information regarding appropriate brushing techniques. Despite this interest, only half reported receiving professional demonstrations from a dentist.

Table 6: Association Between Knowledge and Practice Variables

Variables Compared	χ^2 Value	P-value	Significance
Fluoride awareness vs Fluoridated toothpaste use	29.13	<0.001	Highly Significant
Awareness of circular brushing vs Actual circular brushing practice	12.45	<0.001	Highly Significant
Dentist demonstration vs Awareness of brushing techniques	16.70	<0.001	Highly Significant
Dentist demonstration vs Willingness to change brushing method	9.69	0.002	Significant
Awareness of circular brushing vs Belief in effectiveness	12.93	<0.001	Highly Significant

Inference: Significant associations were observed between parental awareness and oral hygiene practices. Parents who were aware of fluoride benefits and recommended brushing techniques were significantly more likely to implement these practices. Professional demonstrations by dentists were strongly associated with improved awareness and greater willingness to adopt recommended brushing methods.

Discussion

Oral hygiene practices established during early childhood play a crucial role in determining oral health outcomes throughout life. Since children aged 3–6 years depend largely on their parents for the development and reinforcement of health-related behaviors, parental knowledge, attitudes, and practices significantly influence children's oral hygiene habits [11, 12]. The present study was conducted to assess parental awareness regarding toothbrushing techniques and oral hygiene habits among children and to evaluate the association between parental knowledge and implementation of recommended oral hygiene practices.

One of the most important findings of the present study was that 50% of children reportedly brushed once daily while the remaining 50% brushed twice or more daily. Twice-daily toothbrushing is considered the gold standard for maintaining adequate plaque control and reducing the risk of dental caries [6, 7]. Although the proportion of children brushing twice daily in the present study is encouraging, it still indicates that half of the study population does not meet the recommended oral hygiene standards. Similar findings were reported by Rose and Leperre, who observed that participation in structured toothbrushing programs significantly improved brushing frequency and oral hygiene practices among children [3]. Their findings suggest that regular reinforcement and parental involvement can positively influence children's brushing habits.

Despite satisfactory brushing frequency, 73.6% of children reportedly demonstrated reluctance toward brushing. This finding highlights an important behavioral challenge encountered by parents during oral hygiene maintenance. Similar observations were reported by de Jong-Lenters *et al.*, who identified behavioral resistance, parental self-efficacy, and family routines as significant determinants of children's brushing habits [5]. The authors emphasized that parental supervision and consistent reinforcement are essential for overcoming resistance and establishing positive oral hygiene behaviors. Therefore, strategies aimed at improving children's motivation toward brushing should be incorporated into preventive oral health programs.

The timing of initiation of oral hygiene practices is another critical factor influencing oral health outcomes. In the present study, approximately two-thirds of parents reported initiating toothbrushing after one year of age. This finding is concerning because current pediatric dental guidelines recommend initiating oral hygiene measures immediately after eruption of the first primary tooth [6]. Delayed initiation of oral hygiene practices may increase the risk of plaque accumulation and early childhood caries. Pullishery *et al.* similarly reported delayed introduction of oral hygiene measures among preschool children and emphasized the need for enhanced parental awareness regarding early preventive care [1]. These findings indicate that oral health education should begin during infancy and be integrated into routine pediatric healthcare visits.

With respect to oral hygiene aids, manual toothbrushes were used by 89.6% of participants and represented the predominant method of plaque control. This finding is consistent with previous reports indicating that manual toothbrushes remain the most widely used oral hygiene aid because of their affordability, availability, and ease of use. Although conventional toothbrushes continue to be effective when used correctly, recent innovations have focused on

improving brushing efficiency and compliance. Meghana *et al.* demonstrated that chewable toothbrushes significantly improved oral hygiene status among visually impaired children [24]. Similarly, Shainitha *et al.* reported enhanced plaque reduction and improved compliance with a novel toothbrush among children with cleft lip and palate [25]. Swathi *et al.* further demonstrated favorable parental acceptance and significant plaque reduction with the use of an OmniClean EasyGrip toothbrush among children with cerebral palsy [26]. Although these innovations are primarily designed for children with special healthcare needs, they highlight the importance of adapting oral hygiene aids according to individual requirements and capabilities.

The use of fluoridated toothpaste represents one of the most effective and evidence-based preventive measures against dental caries [7, 8, 9]. In the present study, 66% of respondents reported using fluoridated toothpaste, while 70.8% were aware of its role in preventing dental caries. These findings indicate a relatively satisfactory level of parental awareness regarding fluoride. Similar observations were reported by Ashar *et al.*, who found that most parents recognized the importance of fluoride but lacked comprehensive knowledge regarding its appropriate use and concentration [2]. Numerous systematic reviews have demonstrated the effectiveness of fluoridated toothpaste in reducing caries prevalence among children [7, 8, 9]. Nevertheless, the fact that approximately one-third of respondents continued to use non-fluoridated toothpaste suggests the need for continued educational efforts regarding fluoride-based preventive strategies.

A notable strength of the present study is the inclusion of inferential statistical analysis to evaluate the relationship between parental knowledge and oral hygiene practices. Pearson's Chi-square analysis demonstrated a highly significant association between awareness regarding fluoride and the use of fluoridated toothpaste ($\chi^2 = 29.13$, $p < 0.001$). This finding suggests that parental knowledge directly influences preventive oral health behaviors. Parents who were aware of fluoride's protective role were significantly more likely to choose fluoridated toothpaste for their children. These results support the concept that increasing parental awareness may translate into improved preventive practices and better oral health outcomes.

The prevention of Early Childhood Caries (ECC) depends not only on the availability of preventive measures but also on parental ability to recognize early signs of disease and seek timely intervention. Recently, Sathyaprasad *et al.* highlighted the importance of the "Lift-the-Lip" approach as a simple screening tool that enables parents and caregivers to identify early white-spot lesions and initial stages of demineralization before progression to cavitation. The authors emphasized that lack of parental awareness often results in delayed recognition of disease, ultimately leading to more invasive treatment procedures and poorer oral health outcomes. Furthermore, the study demonstrated that increasing parental awareness regarding early signs of ECC improved preventive dental visits and facilitated timely interventions such as fluoride application, dietary counseling, and oral hygiene reinforcement [28]. These findings support the results of the present study, wherein awareness regarding fluoride use and recommended brushing practices was significantly associated with the implementation of preventive oral hygiene measures. The findings collectively highlight that improving parental

awareness is a critical component of ECC prevention and should form an integral part of community-based oral health promotion programs [28].

Knowledge regarding recommended toothbrushing techniques is equally important for effective plaque control. In the present study, 67.9% of parents were aware that circular brushing is recommended for children, while 78.3% believed circular brushing to be more effective than other brushing methods. However, only 55.7% reported that their children actually practiced circular brushing. This discrepancy indicates a substantial knowledge-practice gap. Similar findings have been reported by El Sepaie *et al.*, who observed that although many mothers possessed satisfactory knowledge regarding oral health, implementation of appropriate oral hygiene practices remained suboptimal [23]. This suggests that knowledge alone may not be sufficient to induce behavioral change.

The significant association observed between awareness of circular brushing and actual brushing practice ($\chi^2 = 12.45$, $p < 0.001$) further supports the importance of parental education. Parents who were aware of recommended brushing techniques were significantly more likely to ensure that their children practiced circular brushing. These findings are consistent with previous reports indicating that parental knowledge is an important determinant of children's oral hygiene behaviors [11, 15]. Consequently, educational interventions targeting parents may significantly improve implementation of recommended brushing practices.

An interesting observation was that only 52.8% of participants had heard about different brushing techniques. This finding indicates that despite relatively good awareness regarding fluoride and circular brushing, knowledge regarding specific brushing methods remains limited. Abijeth and Kanthaswamy similarly reported inadequate awareness regarding brushing techniques among parents and emphasized the importance of practical demonstrations and individualized instruction [4]. Educational programs should therefore focus not only on the importance of brushing but also on the correct method of brushing.

One of the most clinically relevant findings of the present study was the significant impact of professional guidance. Parents who reported receiving demonstrations from a dentist were significantly more likely to be aware of brushing techniques ($\chi^2 = 16.70$, $p < 0.001$) and significantly more willing to modify their child's brushing habits ($\chi^2 = 9.69$, $p = 0.002$). These findings emphasize the critical role of pediatric dentists in promoting preventive oral healthcare. Kay and Locker reported that oral health education is most effective when accompanied by practical demonstrations and reinforcement [17]. Similarly, Davies *et al.* demonstrated that professionally delivered oral health education programs significantly improved oral hygiene behaviors among children and caregivers [18]. The present findings further strengthen the evidence supporting demonstration-based oral health education.

The positive attitude exhibited by parents toward oral health education represents one of the most encouraging findings of the study. Approximately 79.2% of parents expressed willingness to modify their child's brushing method, while 84% desired additional information regarding proper brushing techniques. These findings suggest that parents are receptive to oral health education and recognize the importance of preventive oral healthcare. Similar findings

were reported by Aravind *et al.*, who demonstrated significant improvements in maternal awareness following motivational interviewing-based anticipatory guidance interventions [21]. Likewise, Babu *et al.* reported substantial improvements in knowledge and attitudes among mothers of children with special healthcare needs after motivational interviewing sessions [22]. These studies support the implementation of structured educational interventions aimed at improving parental awareness and promoting positive behavioral change.

Sathyaprasad *et al.* observed that increased parental supervision was associated with improved oral hygiene practices among children despite lifestyle changes and altered dietary habits [27]. This finding reinforces the present study's conclusion that active parental involvement remains one of the strongest determinants of successful oral hygiene maintenance during childhood.

Overall, the findings of the present study demonstrate that parental awareness regarding oral hygiene is relatively satisfactory; however, a gap remains between knowledge and practical implementation. The significant associations identified through Chi-square analysis confirm that parental knowledge and professional guidance play important roles in shaping children's oral hygiene behaviors. Therefore, preventive oral health programs should focus not only on increasing awareness but also on facilitating behavioral change through practical demonstrations, motivational interviewing, anticipatory guidance, and regular reinforcement. Such interventions may significantly improve oral hygiene practices and contribute to reducing the burden of preventable oral diseases among children.

Clinical Significance

Parents play a fundamental role in shaping oral hygiene behaviors during early childhood. The findings of the present study highlight the need for targeted parental education programs focusing on proper toothbrushing techniques, fluoride usage, and supervision of oral hygiene practices. Incorporating practical demonstrations and motivational interviewing into routine pediatric dental care may improve parental knowledge and facilitate behavioral change, ultimately reducing the prevalence of dental caries and other preventable oral diseases among children.

Limitations of the Study

- Cross-sectional design limits the ability to establish causal relationships.
- Reliance on self-reported responses may introduce reporting bias.
- Relatively small sample size.
- Single-center study limits generalizability.
- Absence of clinical examination to correlate reported practices with actual oral health status.

Conclusion

The present study demonstrated moderate-to-good parental awareness regarding oral hygiene practices and recommended toothbrushing techniques among children aged 3–6 years. Awareness regarding fluoridated toothpaste and circular brushing techniques was relatively satisfactory; however, a substantial gap existed between parental knowledge and actual implementation of recommended oral hygiene practices. Most parents exhibited positive attitudes toward oral health education and expressed willingness to

modify their children's brushing habits when provided with appropriate guidance. The findings emphasize the importance of strengthening parental education through practical demonstrations, anticipatory guidance, and motivational interviewing strategies. Such interventions may improve oral hygiene behaviors among children and contribute significantly to the prevention of oral diseases during early childhood.

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