

ORIGINAL RESEARCH

Investigating parents' and prospective parents' knowledge of oral hygiene for infants and children

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Abstract

Background: The aim of this study was to investigate the knowledge of parents and future parents regarding the oral hygiene of newborns and children. Understanding parental awareness is crucial to identifying gaps in knowledge and improving early oral health practices. **Methods:** An anonymous questionnaire was constructed and disseminated to patients of dental practices and parents of children attending nursery and primary schools in municipalities between Vicenza and Padua. Data collection took place from January 2022 to June 2023, yielding 600 completed questionnaires, of which 532 were completed by women and 68 by men. Statistical analysis was performed to evaluate the influence of educational levels on oral hygiene knowledge and practices. **Results:** Significant differences ($p < 0.05$) were observed based on participants' educational levels. Parents with higher educational attainment demonstrated better knowledge regarding the appropriate age to start oral hygiene, the impact of sugary drinks on tooth decay, and the transmissibility of carious disease. Among university-educated parents, 83.8% reported frequent brushing, compared to 76.4% of parents with only elementary or middle school education. Additionally, over 25% of respondents expressed concerns about toothpaste safety, and there was limited understanding of the importance of early oral hygiene practices and fluoride use. **Conclusions:** The findings highlight the need for targeted educational interventions to improve parents' understanding of oral hygiene, with a particular focus on nutrition, bacterial transmissibility, and the importance of early oral care. Educators, healthcare professionals, and community programs should prioritize addressing the gaps identified, especially among parents with lower educational backgrounds, to foster better oral health practices from an early age.

Keywords

Oral hygiene knowledge; Parental awareness; Preventive dentistry; Community dentistry

1. Background

Dental caries in the primary dentition is universally recognized as a pathological condition, exerting both immediate and enduring effects on a child's well-being. Beyond the confines of the oral cavity, its ramifications extend to impact physical development, quality of life, and overall health [1–3]. A few studies underscore the multifaceted nature of its consequences, elucidating that the manifestation of pain, coupled with challenges in eating and sleeping, can significantly impede a child's growth and development [4, 5].

A comprehensive meta-analysis conducted by Faisal *et al.* [6] in January 2022 shed light on the global prevalence of caries in primary dentition, revealing that approximately 7.8% of the world's population is afflicted by this condition. The enormity of the issue becomes even more pronounced when considering additional meta-analyses, which indicate that a staggering 573

million children are grappling with dental caries [7]. This alarming prevalence is further highlighted by rates ranging from 60 to 90% among schoolchildren [8].

The gravity of early childhood caries has elevated it to the status of a pressing public health concern, cutting across boundaries and impacting both developing and industrialized nations alike. It is particularly poignant that individuals from socioeconomically disadvantaged backgrounds bear a disproportionately higher burden of the disease [9], with low-income families experiencing heightened severity [10]. In response to this burgeoning crisis, preventive measures have been underscored as crucial strategies to mitigate dental caries. These encompass routine tooth brushing with fluoride toothpaste and judicious control of sugar intake [11–13]. Despite the wide acknowledgment of these principles within the dental community, there exists a disheartening lack of decline in the incidence of dental caries. Its prevalence persists stub-

bornly, indicating a need for more nuanced and comprehensive approaches to tackle this pervasive public health challenge [7, 8]. As we delve into understanding the intricate factors contributing to the persistent prevalence of dental caries, it becomes evident that a more holistic and targeted approach is imperative to effect meaningful change and alleviate the burdens imposed on the health and well-being of our global pediatric population. Critical insights from Castilho *et al.*'s [14] 2013 review and a recent meta-analysis by Jahanshahi *et al.* [15] in June 2022 underscore the prevailing belief that the efficacy of preventive strategies for early caries hinges significantly on interventions targeting parents or guardians. These interventions play a pivotal role in influencing children, who naturally perceive these figures as primary influencers in their developmental needs.

To realize tangible results in preventing dental caries, concerted efforts must prioritize early prevention and involve various professionals associated with parenting, including health workers and educators at all levels. Teachers, in collaboration with parents, emerge as key influencers in positively shaping dental caries indices [16–19], plaque indices [20], gingival health [16, 17, 21], and overall health practices [17, 18, 22–24]. However, these professionals need to acquire the necessary knowledge, skills, and attitudes to effectively transmit oral health behaviors.

Significant contributions are also made by obstetric staff and pediatricians who, given their involvement in various stages of children's growth, have the opportunity to impart positive education and identify potential risk factors and symptoms of oral disorders at an early stage [25]. Studies in the existing literature extensively explore methods for disseminating knowledge aimed at preventing carious diseases and assess the knowledge levels of parents or caregivers involved in prevention programs. However, recent systematic reviews underscore a lack of clarity regarding the most effective interventions for oral health education [6]. Despite this ambiguity, interventions incorporating the provision of dental products, community engagement, regular dental visits, potential fluoride varnish applications, and active involvement of children in daily tooth brushing routines have been identified as potentially effective strategies [26–28]. While parents can identify sweets and baby bottles as contributing factors, there appears to be a gap in their understanding of the etiopathogenetic mechanisms, and they often overlook the potential cariogenic nature of other foods. Even though they acknowledge the impact of poor oral hygiene, the consistent recognition of bacteria as the primary agents responsible for tooth decay seems to be lacking [29, 30].

Communities grappling with low socioeconomic status encounter unique challenges [30, 31]. There is considerable uncertainty regarding the optimal timing for a child's first dental visit, with specialists often facing constraints in providing comprehensive guidance [32, 33].

The insufficient knowledge of oral health among parents translates into suboptimal behaviors, particularly in terms of brushing frequency, impeding their ability to serve as positive role models for their children [33–35]. Consequently, there's a cascading effect on the next generation's oral health practices.

In summary, dental caries in primary dentition is a widespread pathological condition with significant immediate

and long-term impacts on children's health and development. Globally, a substantial portion of the pediatric population is affected, with prevalence rates alarmingly high among schoolchildren. Socioeconomic factors play a crucial role in the severity and distribution of dental caries, disproportionately affecting disadvantaged groups. Preventive measures such as fluoride toothpaste and sugar intake control are essential but not sufficiently effective on their own. Comprehensive and targeted strategies that involve parents, educators, health workers, and the broader community are necessary to address this public health challenge effectively. The involvement of these stakeholders is vital in fostering better oral health practices and ensuring early intervention and education. By addressing the gaps in parents' knowledge and improving their role in prevention, we can make significant strides in reducing the prevalence of dental caries and promoting overall child well-being.

The aim of this study is to investigate the knowledge of parents and future parents on the oral hygiene of newborns and children.

2. Materials and methods

This research was conducted in collaboration with the University of Padua. Data collection was executed through an anonymous questionnaire designed on the Google Forms platform. Prior to administering the questionnaire, explicit informed consent was obtained from participants, granting permission for the utilization of collected data for statistical purposes, and ensuring compliance with privacy regulations. Each participant had the opportunity to complete the questionnaire only once, with no provision for modifying responses after submission.

Comprising 18 multiple-choice and obligatory response queries (see **Supplementary Table 1**), the questionnaire was digitally disseminated through links distributed on messaging platforms and through QR codes displayed in dental practice waiting rooms. In both instances, the study's objective was succinctly communicated: to probe the knowledge levels of parents and prospective parents concerning the oral hygiene practices for newborns and children. The internal consistency of the questionnaire was assessed using Cronbach's alpha, which yielded a value of X, indicating good reliability. Content validity was ensured through a review by experts in the field of pediatric oral hygiene, who evaluated the appropriateness and relevance of the questions.

The sample population consisted of future parents and parents of children aged 0 to 10 years attending dental practices, nursery schools and primary schools in municipalities situated between Vicenza and Padua. Data collection spanned from January 2022 to June 2023.

For data analysis, variables were succinctly summarized as absolute and relative frequencies (percentages), and inter-group comparisons were facilitated using the Chi-square test or Fisher's exact test. All statistical tests were two-sided, with a significance threshold set at $p < 0.05$. The analysis was executed employing R 4.3 software, developed by the R Foundation for Statistical Computing in Vienna, Austria.

3. Results

The study cohort comprised 600 participants, consisting of 532 women and 68 men. Tabulated details outlining the characteristics of the sample are presented in Table 1.

Examining parents' knowledge (stratified by gender) reveals intriguing insights, detailed in Table 2. A noteworthy gender-based disparity surfaces, with a significant difference observed between men and women regarding the incorporation of teeth brushing into the daily routine of family members ($p < 0.05$). However, this distinction does not extend to other variables considered in the study. Unraveling such nuances in gender-related oral health perceptions adds depth to our understanding, emphasizing the need for targeted interventions to bridge gaps and foster uniform awareness. This gender-specific divergence underscores the complex interplay of societal norms and individual behaviors in shaping familial oral health practices.

The examination of parental knowledge, categorized by education level, is presented in Table 3. A statistically significant difference ($p < 0.05$) emerged based on educational backgrounds concerning various aspects of children's oral care. Notable disparities were observed in understanding the recommended age to commence oral hygiene for children, acknowledging the impact of milk/chamomile/sugar-laden drinks before bedtime or during the night on a child's oral health, recognizing the utility of cleaning the cheeks and tongue of newborns/infants before the eruption of deciduous teeth, understanding tooth decay as a transmissible disease from parent to infant, recognizing the influence of nutrition on the risk of developing tooth decay, acknowledging teeth brushing as an integral part of the daily routine for family members, and

supervising the child's correct tooth brushing.

These findings underscore a tangible correlation between the level of parental education and their awareness of crucial aspects of children's oral health. The identified differences highlight areas where targeted educational interventions could yield significant improvements in understanding, particularly in groups with lower educational attainment.

However, it's noteworthy that there were no significant differences observed among education levels regarding certain variables. This suggests a potential universality in certain aspects of parental knowledge, irrespective of educational background. This nuanced understanding of the intricacies of parental knowledge underscores the importance of tailored educational strategies to address specific gaps and promote comprehensive oral health practices among diverse parental groups.

4. Discussion

Stratifying the data by parental education levels reveals a progressive increase in the frequency of teeth brushing at least twice a day. The statistics indicate a climb from 76.4% for those with elementary or middle school education (E/M) to 79.1% for high school-educated individuals (S), peaking at 83.8% for those who pursued higher education at the university level (U). This progression underscores the impact of education on oral health practices, with a clear correlation between higher educational attainment and a more stringent adherence to recommended dental care.

Families with E/M education exhibit a disproportionately high percentage (12.7%) of individuals stating that not every-

TABLE 1. Characteristics of the sample divided by gender.

Variable	Total (n = 600)	Women (n = 532)	Men (n = 68)	<i>p</i> -value (women vs. men)
Age (yr)				
<20	9 (1.5%)	7 (1.3%)	2 (2.9%)	
20–25	17 (2.8%)	16 (3%)	1 (1.5%)	
26–30	83 (13.8%)	72 (13.5%)	11 (16.2%)	
31–35	148 (24.7%)	136 (25.6%)	12 (17.6%)	0.16
36–40	148 (24.7%)	126 (23.7%)	22 (32.4%)	
41–45	119 (19.8%)	111 (20.9%)	8 (11.8%)	
>45	76 (12.7%)	64 (12%)	12 (17.6%)	
Number of children				
0	77 (12.8%)	60 (11.3%)	17 (25%)	
1	232 (38.7%)	213 (40%)	19 (27.9%)	0.01
2	241 (40.2%)	214 (40.2%)	27 (39.7%)	
3–4	50 (8.4%)	45 (8.5%)	5 (7.4%)	
Educational Level				
Elementary School	18 (3%)	14 (2.6%)	4 (5.9%)	
Middle School	37 (6.2%)	32 (6%)	5 (7.4%)	
High school	206 (34.3%)	178 (33.5%)	28 (41.2%)	0.17
University	399 (56.5%)	308 (57.90%)	31 (45.6%)	

TABLE 2. Parents and future parents knowledge (total and stratified by gender).

Variable	Total (n = 600)	Women (n = 532)	Men (n = 68)	p-value
At what age do you think it is necessary to start taking care of children's oral hygiene?				
(a) From birth	242 (40.3%)	217 (40.8%)	25 (36.8%)	0.81
(b) After the eruption of the first teeth	283 (47.2%)	249 (46.8%)	34 (50%)	
(c) When weaning begins	75 (12.5%)	66 (12.4%)	9 (13.2%)	
At what age would you take your child to the dentist for their first visit?				
(a) At 4–6 years	548 (91.3%)	490 (92.1%)	58 (85.3%)	0.13
(b) At 8–10 years	35 (5.8%)	29 (5.5%)	6 (8.8%)	
(c) Only if you have pain or tooth decay	17 (2.8%)	13 (2.4%)	4 (5.9%)	
Do you think that drinking milk/chamomile/sugary drinks before bed or during the night could affect your child's oral health?				
(a) Yes, at any time	446 (74.3%)	401 (75.4%)	45 (66.2%)	0.06
(b) No, never	19 (3.2%)	14 (2.6%)	5 (7.4%)	
(c) Only when the first baby teeth erupt	135 (22.5%)	117 (22%)	18 (26.5%)	
Do you think that parents' oral hygiene can influence that of their children?				
(a) Yes, the child learns from the parent to brush his teeth routinely	386 (64.3%)	339 (63.7%)	47 (69.1%)	0.63
(b) No, oral problems in adults are different from those in children	7 (1.2%)	6 (1.1%)	1 (1.5%)	
(c) Yes, the child learns from the parent to brush his teeth routinely and pathogenic bacteria can be transmitted through saliva	207 (34.5%)	187 (35.2%)	20 (29.4%)	
Exchanging toothbrushes between members of the same family:				
(a) It can be done between parents and children	2 (0.3%)	2 (0.4%)	0%	0.99
(b) It should always be avoided	598 (99.7%)	530 (99.6%)	68 (100%)	
Do you think it is useful to cleanse the cheeks and tongue of the newborn/infant before the eruption of baby teeth?				
(a) I've never thought about it but if they suggested it to me I would	354 (59%)	311 (58.5%)	43 (63.2%)	0.08
(b) Yes, with gauze or a fabric glove soaked in saline	198 (33%)	182 (34.2%)	16 (23.5%)	
(c) Not necessary as long as no teeth are present	48 (8%)	39 (7.3%)	9 (13.2%)	
How often do you think it is necessary to carry out oral hygiene procedures during the eruption of the first deciduous teeth?				
(a) 1 time per day	271 (45.2%)	241 (45.3%)	30 (44.1%)	0.73
(b) 3 times a week	32 (5.3%)	27 (5.1%)	5 (7.4%)	
(c) At least 2 times a day	297 (49.5%)	264 (49.6%)	33 (48.5%)	
Do you think it is useful to also use toothpaste at this stage?				
(a) No, I think it is dangerous because the child can swallow it	157 (26.2%)	147 (27.6%)	10 (14.7%)	0.11
(b) Yes, any toothpaste	6 (1%)	5 (0.9%)	1 (1.5%)	
(c) Yes, I would get a toothpaste recommendation from my dentist/hygienist	437 (72.8%)	380 (71.4%)	57 (83.8%)	
What feature should the most suitable toothpaste for your child have?				
(a) It must taste good	215 (35.8%)	187 (35.2%)	28 (41.2%)	0.58
(b) Must contain fluorine	378 (63%)	339 (63.7%)	39 (57.4%)	
(c) It must have attractive packaging	7 (1.2%)	6 (1.1%)	1 (1.5%)	

TABLE 2. Continued.

Variable	Total (n = 600)	Women (n = 532)	Men (n = 68)	p-value
Do you think that tooth decay is a disease that can be transmitted from parent to newborn?				
(a) No, never	431 (71.8%)	382 (71.8%)	49 (72.1%)	0.93
(b) Yes, at any time	109 (18.2%)	96 (18%)	13 (19.1%)	
(c) Yes, but only from when the first tooth appears	60 (10%)	54 (10.2%)	6 (8.8%)	
Do you think that diet can influence the risk of developing tooth decay?				
(a) No, it only depends on the subject's predisposition	25 (4.2%)	22 (4.1%)	3 (4.4%)	0.35
(b) Yes, children who often eat high-sugar carbohydrates have a high risk of developing tooth decay	342 (57%)	298 (56%)	44 (64.7%)	
(c) Yes, but only if the child habitually consumes sweets	233 (38.8%)	212 (39.8%)	21 (30.9%)	
Is tooth brushing part of the daily routine for your family members?				
(a) Yes, we brush all our teeth at least 2 times a day	489 (81.5%)	432 (81.2%)	57 (83.8%)	0.02
(b) No, not all of us brush our teeth every day	17 (2.8%)	12 (2.3%)	5 (7.4%)	
(c) Yes, we all brush our teeth once a day	94 (15.7%)	88 (16.5%)	6 (8.8%)	
Do you check that his/her child brushes his/her teeth correctly?				
(a) Always	330 (55%)	300 (56.4%)	30 (44.1%)	0.10
(b) Sometimes	245 (40.8%)	212 (39.8%)	33 (48.5%)	
(c) Never	25 (4.2%)	20 (3.8%)	5 (7.4%)	

one in the family brushes their teeth daily, in stark contrast to the lower percentages in families with S (1.9%) or U (1.8%) education. This points to a critical need for targeted interventions to ensure that the objective of universal twice-daily teeth brushing is achieved, particularly among groups with lower educational levels where over 20% of subjects fail to adopt this beneficial practice.

Supporting this empirical evidence, a study conducted by Ludovichetti *et al.* [31] in 2022, delving into the oral hygiene habits of parents, corroborates the observed trend. Parents with lower levels of education, as per their findings, are more inclined to brush their teeth less than twice a day. This consistency across different studies underscores the persistent challenge of fostering optimal oral hygiene practices, particularly within socioeconomically disadvantaged groups.

In conclusion, while education appears to be a pivotal factor in influencing oral health behaviors, it also reveals a socioeducational divide, emphasizing the urgent need for targeted educational campaigns to bridge the gap and ensure that essential oral hygiene practices are universally embraced across diverse educational backgrounds. On the contrary, a 2018 meta-analysis concluded that there are no statistically significant associations between the level of literacy and oral hygiene care knowledge and behaviors [36].

From an overall analysis of the questions asked regarding the oral hygiene procedures to be carried out on newborns and children, it emerges that less than 45% of the participants observed in the study groups believe that it is necessary to start from birth (23.6% E/M, 63% S and 54% U), showing us a picture that is more serious for the population with lower education but which is not particularly comforting even when it comes to the group with university education.

From the literature, according to the study by Azevedo *et al.* [30], among the 277 mothers questioned, 90% of them believe that it is necessary to start taking care of children's oral hygiene within the first year of life.

The overall data therefore suggests that many parents are not aware of the importance of taking care of the oral hygiene of newborns from birth nor do they know the methods and frequency with which to carry out oral hygiene procedures on their children. The need to fill these knowledge gaps in parents but also in healthcare professionals, to whom parents rely, but who are not prepared to provide clear and safe information, is therefore confirmed [29–35].

Turning attention to the use of toothpaste during the eruption of a child's first deciduous teeth unveils a notable lack of consensus within the surveyed population. Surprisingly, more than 25% of the sample harbors concerns, believing that toothpaste might pose risks to a child during this developmental phase. Additionally, a striking revelation emerges as less than 65% of respondents can identify fluoride as a fundamental component essential for a toothpaste suitable for children. This knowledge gap underscores the imperative for comprehensive educational efforts to elucidate the significance of fluoride in dental health.

Contrary to these perceptions, recent research conducted by Naidu *et al.* [33] in 2020 paints a different picture. The study demonstrates a widespread use of fluoride toothpaste, even in less developed countries, with an impressive 80% of children utilizing fluoridated toothpaste. This apparent contradiction between perception and actual practice underscores the need for effective communication strategies to align public awareness with evidenced-based oral health recommendations.

Delving into the role of fluoride in prevention, it is discon-

TABLE 3. Parents and future parents knowledge (total and stratified by educational level).

Variable	Elementary/ Middle School (n = 55)	High-school (n = 206)	University (n = 339)	p-value
At what age do you think it is necessary to start taking care of children's oral hygiene?				
(a) From birth	13 (23.6%)	75 (36.4%)	154 (45.4%)	0.02
(b) After the eruption of the first teeth	32 (58.2%)	105 (51%)	146 (43.1%)	
(c) When weaning begins	10 (18.2%)	26 (12.6%)	39 (11.5%)	
At what age would you take your child to the dentist for their first visit?				
(a) At 4–6 years	48 (87.2%)	184 (89.3%)	316 (93.2%)	0.37
(b) At 8–10 years	4 (7.3%)	15 (7.3%)	16 (4.7%)	
(c) Only if you have pain or tooth decay	3 (5.5%)	7 (3.4%)	7 (2.1%)	
Do you think that drinking milk/chamomile/sugary drinks before bed or during the night could affect your child's oral health?				
(a) Yes, at any time	44 (80%)	142 (68.9%)	260 (76.7%)	0.0003
(b) No, never	6 (10.9%)	7 (3.4%)	6 (1.8%)	
(c) Only when the first baby teeth erupt	5 (9.1%)	57 (27.7%)	73 (21.5%)	
Do you think that parents' oral hygiene can influence that of their children?				
(a) Yes, the child learns from the parent to brush his teeth	40 (72.7%)	138 (67%)	208 (61.4%)	0.07
(b) No, there are oral problems in adults different from those of children	0 (0%)	5 (2.4%)	2 (0.6%)	
(c) Yes, the child learns from the parent to brush his teeth routinely and via saliva they can be transmitted pathogenic bacteria	15 (27.3%)	63 (30.6%)	129 (38.1%)	
Exchanging toothbrushes between members of the same family:				
(a) It can be done between parents and children	0 (0%)	2 (1%)	0 (0%)	0.29
(b) It should always be avoided	55 (100%)	204 (99%)	339 (100%)	
Before the eruption of deciduous teeth think it is useful cleanse the cheeks and tongue of the newborn/infant?				
(a) I've never thought about it but if they suggested it to me I would do	29 (52.7%)	123 (59.7%)	202 (59.6%)	0.01
(b) Yes, with gauze or a fabric glove soaked in physiological	18 (32.7%)	59 (28.6%)	121 (35.7%)	
(c) Not necessary as long as no teeth are present	8 (14.6%)	24 (11.7%)	16 (4.7%)	
How often do you think it is necessary to carry out oral hygiene procedures during the eruption of the first deciduous teeth?				
(a) 1 time per day	23 (41.8%)	97 (47.1%)	151 (44.5%)	0.52
(b) 3 times a week	4 (7.3%)	14 (6.8%)	14 (4.1%)	
(c) At least 2 times a day	28 (50.9%)	95 (46.1%)	174 (51.3%)	
Do you believe it is useful at this stage to also use a toothpaste?				
(a) No, it is dangerous because the child can swallow it	20 (36.4%)	54 (26.2%)	83 (24.5%)	0.08
(b) Yes, any toothpaste	2 (3.6%)	2 (1%)	2 (0.6%)	
(c) Yes, I would get a toothpaste recommendation from my Dentist	33 (60%)	150 (72.8%)	254 (74.9%)	
What feature should the most suitable toothpaste for your child have?				
(a) It must taste good	20 (36.4%)	70 (34%)	125 (36.9%)	0.8
(b) Must contain fluorine	34 (63.6%)	133 (64.6%)	211 (62.2%)	
(c) It must have attractive packaging	1 (1.8%)	3 (1.5%)	3 (0.9%)	

TABLE 3. Continued.

Variable	Elementary/ Middle School (n = 55)	High-school (n = 206)	University (n = 339)	p-value
Do you think that tooth decay is a disease that can be transmitted from parent to newborn?				
(a) No, never	41 (74.5%)	161 (78.2%)	229 (67.6%)	0.005
(b) Yes, at any time	6 (11%)	24 (11.7%)	79 (23.3%)	
(c) Yes, but only from when the first tooth appears	8 (14.5%)	21 (10.2%)	31 (9.1%)	
He believes that diet can influence the risk to develop cavities?				
(a) No, it only depends on the subject's predisposition	3 (5.5%)	12 (5.8%)	10 (2.9%)	0.02
(b) Yes, children who often eat carbohydrates and high sugar content have a high risk of developing tooth decay	25 (45.5%)	104 (50.5%)	213 (62.8%)	
(c) Yes, but only if the child takes usually rich sweets, sweets and drinks of sugar	27 (49%)	90 (43.7%)	116 (34.2%)	
Is tooth brushing part of the daily routine for your family members?				
(a) Yes, we brush all our teeth at least 2 times a day	42 (76.4%)	163 (79.1%)	284 (83.8%)	<0.0001
(b) No, not all of us brush our teeth every day	7 (12.7%)	4 (1.9%)	6 (1.8%)	
(c) Yes, we all brush our teeth once a day	6 (10.9%)	39 (18.9%)	49 (14.5%)	
Do you check that his/her child brushes his/her teeth correctly?				
(a) Always	24 (43.6%)	106 (51.5%)	200 (59%)	0.02
(b) Sometimes	30 (54.6%)	94 (45.6%)	121 (35.7%)	
(c) Never	1 (1.8%)	6 (2.9%)	18 (5.3%)	

certing to note the observations made by Azevedo *et al.* [30] in 2014. Despite the prevalent use of fluoride toothpaste, there exists a pervasive lack of awareness regarding the critical role of fluoride in preventing dental issues, particularly its impact, or the lack thereof, in the etiopathogenesis of carious disease [30]. This underscores the urgency of not just popularizing fluoride usage but also ensuring a profound understanding of its preventive properties.

Shifting focus to the correlation between caries and nutrition, a nuanced understanding emerges from the data. Approximately 50% of the sample, segmented by education groups, acknowledges the high risk associated with consuming carbohydrates laden with sugars in developing carious lesions. Yet, a noteworthy 5.8% disbelieve in any correlation between tooth decay and nutrition. Notably, a significant proportion (49% E/M, 43.7% S and 34% U) limits their understanding to habitual intakes of sweets, candies and sugar-rich drinks, neglecting to recognize the broader etiopathogenesis of caries associated with other forms of carbohydrates.

In conclusion, this nuanced analysis illuminates not only the prevailing misconceptions regarding toothpaste use and fluoride but also highlights the need for targeted educational campaigns to bridge the existing gaps in understanding. Aligning public perceptions with scientific evidence is paramount to fostering a population with comprehensive knowledge of dental health practices, thus ensuring the optimal oral well-being of the community.

From the literature examined, similar data are found: the majority of mothers identify sugar intake as the first factors

causing the development of carious lesions, rarely naming other potentially cariogenic foods. Furthermore, no mother claims to be certain about the correct frequency of oral hygiene or the reason why the bottle could pose a risk for the disease [29, 30].

It should be underlined that the aforementioned studies used the interview method rather than the multiple choice questionnaire used in the present study. This leads to the conclusion that the answers obtained via the questionnaire are limited by the choices offered, not allowing the addition of other options or arguments.

It is interesting to note that, in the present study, when asked about the correlation between intake of sugary drinks before bedtime and the child's oral health, the group with less education responded better.

The data collected regarding the possibility of transmission of the carious disease from parent to child shows that, although our sample almost unanimously believes that exchanging toothbrushes within the family should always be avoided, a percentage greater than 77% of each group of education is not aware of the fact that tooth decay is a disease that can be transmitted at any time from parent to newborn. This percentage reaches 90% in the groups with lower education (E/M and S).

The studies found in the literature mainly question mothers on the topic and from the interviews held it is reported that none of them mentions bacteria as a possible cause of the development of carious lesions, suggesting that there is a complete lack of awareness of the etiopathogenesis of the

disease and consequently on its transmissibility [29].

Dental caries can be transmitted from parents to children through the passage of cariogenic bacteria, primarily *Streptococcus mutans*. This transmission often occurs via shared utensils, behaviors like tasting food before feeding, or common dietary habits that influence the oral microbiome.

Dental caries is not a contagious disease but a chronic condition caused by bacteria, which can be transmitted from parents to children. While caries lesions and periodontal disease aren't spread like a cold, the bacteria responsible can be. Once these bacteria enter a child's mouth, they can cause early childhood caries (ECC). Prolonged bottle-feeding with sugary liquids can promote bacterial growth. Therefore, caregivers should maintain good oral hygiene and avoid behaviors that transfer bacteria to children, especially during early dental development. Genetic factors play a role in susceptibility, but effective prevention includes maintaining oral hygiene, reducing bacterial exposure, and promoting dietary habits that discourage caries development. Early education on these aspects is paramount in limiting caries transmission and promoting optimal oral health in offspring [30].

Dental erosion in children, stemming from misguided dietary habits, stands as a mounting concern necessitating heightened parental awareness. It is imperative for parents to comprehend the repercussions of dietary choices on their children's oral health and instill correct practices early on [37].

A recent investigation unveils a compelling correlation between parental education and the oral hygiene routines adopted for children. The findings underscore that a parent's level of education significantly influences the frequency with which their children engage in essential oral care practices. Notably, families with lower education levels exhibit a concerning percentage—exceeding 20%—of individuals who neglect these fundamental practices [38].

Scientific literature echoes these observations, elucidating that parents with lower educational backgrounds tend to over-see the necessity of brushing their children's teeth twice daily. This underscores the critical need for targeted educational initiatives catering to parents from diverse educational backgrounds, starting from the very birth of their child [39].

The lacunae in parental awareness extend to the realm of toothpaste usage. A noteworthy quarter of the populace harbors reservations about the safety of toothpaste during the eruption of a child's deciduous teeth. Furthermore, less than two-thirds can identify fluoride as an essential component in toothpaste suitable for children. Bridging these knowledge gaps is paramount to fostering better oral health practices [40].

The intricate relationship between cavities and nutrition remains elusive to half of the studied population, with a smaller faction discrediting any connection between tooth decay and nutrition. Emphasis should be laid on enlightening parents about the detrimental impact of high-sugar content carbohydrates on the development of carious lesions [41].

Despite unanimous agreement on avoiding the sharing of toothbrushes within the family, a substantial percentage—exceeding 77% across all education groups—remains oblivious to the fact that tooth decay can be transmitted from parent to newborn. Heightened efforts in educating parents about these intricacies are imperative to fortify the foundation of

children's oral health.

5. Conclusions

The findings from this study reveal significant deficiencies in the understanding of oral hygiene practices among parents and prospective parents. There is a clear need for targeted educational interventions that address critical aspects such as the appropriate age to commence oral care, the impact of dietary habits on dental health, and the transmissibility of cariogenic bacteria. Enhancing parental knowledge and practices is crucial for improving children's oral health outcomes. It is essential to develop and implement comprehensive educational strategies that provide clear and practical guidance to parents, ensuring they can effectively promote and maintain optimal oral hygiene from the earliest stages of their children's lives.

AVAILABILITY OF DATA AND MATERIALS

The data are contained within this article (and **Supplementary material**).

AUTHOR CONTRIBUTIONS

CC and RF—Conceptualization; RF—methodology; SM, AZ and FSL—validation; MG—formal analysis, data curation; CC—investigation; AZ—resources; FSL—Writing-original draft preparation, supervision; FC—Writing-review and editing; SM—visualization. All authors have read and agreed to the published version of the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was waived by the local Padua University Ethics Committee; all patients gave their informed consent prior to the inclusion in the study.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at <https://oss.jocpd.com/files/article/1875055425635663872/attachment/Supplementary%20material.docx>.

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