

Parents' and caregivers' knowledge and perception towards the use of fluoridated toothpaste in children

Haifa AlAmro^{1,2,3,*}, Meshal Alwadi³, Khalid Alrehaili³, Ali Alotaibi³, Rayan Alkadi³, Abdulaziz Alomran³ and Abdullah Alhussain³

¹ Preventive Dental Science Department, College of Dentistry, King Saud Bin Abdulaziz University for Health Sciences, Riyadh 11426, Saudi Arabia

² King Abdullah International Medical Research Centre, Ministry of National Guard Health Affairs, Riyadh 11481, Saudi Arabia

³ College of Dentistry, King Saud Bin Abdulaziz University for Health Sciences, Riyadh 11426, Saudi Arabia

* Corresponding Author: haifa.alamro@hotmail.com

Abstract

Background:

Objective: The study aimed to evaluate parents' and caregivers' knowledge and perception of the use of fluoridated toothpaste, as well as the importance of their involvement in the child's oral hygiene practices, and the amount of fluoridated toothpaste dispensed. A self-developed questionnaire was distributed to 388 parents/ caregivers.

Results: Low levels of perception and knowledge were observed in a high percentage of the participants. About 51% of the parents were unsure whether the toothpaste was fluoridated, and 87% were unaware of the fluoride concentration. Furthermore, 42% of parents never got involved in tooth brushing, 13% brush their children's teeth by themselves, and only 4.9% check their child's teeth after brushing. Almost 86% of children reported rinsing after brushing, while 3.1% spit without rinsing, and 4.9% of the participants were unsure. Mothers have higher knowledge and perception levels compared to fathers.

Conclusion: Even though parents are involved in their children's toothbrushing, they do not know how much toothpaste should be dispensed for each specific age. Such findings suggest that there is a lack of awareness of proper guidelines for the selection and usage of toothpastes in children. Parents should be motivated to supervise and assist their children's brushing using the proper toothpaste appropriate for their age.

Keywords: fluoride concentration; toothpaste; knowledge; oral hygiene

1. Introduction

Caries is known to be one of the most common prevalent diseases worldwide. It is costly to society, but the cost of childhood caries goes beyond the cost of direct healthcare; it includes the social cost of pain, adverse effects on cognitive development, increased school absenteeism, increased caregiver absenteeism from work, and lower oral health-related quality of life (1).

The prevalence of caries in school-age children in Saudi Arabia is estimated to be 80% in primary dentition and 70% in permanent dentition (2). According to a meta-analysis of more than 70 randomized or quasi-randomized controlled clinical trials, fluoridated toothpastes are effective in lowering the prevalence of dental caries in permanent teeth, with the effect increasing in children with a higher baseline level of caries and a more significant concentration of fluoride in the toothpaste, greater frequency of use, and supervision of brushing (3,4). A meta-analysis of eight clinical trials on caries increment in preschool children also shows that tooth brushing with fluoridated toothpaste significantly reduces dental caries

prevalence in primary dentition (5). Using no more than a smear or rice-size amount of fluoridated toothpaste for children less than three years of age may decrease the risk of fluorosis. Using no more than a pea-size amount of fluoridated toothpaste is appropriate for children aged three to six (6). To maximize the beneficial effect of fluoride in toothpaste, brushing should be done twice a day under supervision, and rinsing after brushing should be reduced or eliminated (7).

A recent study conducted in Chicago showed that approximately 41% of children brushed once a day or less, and 19% of caregivers did not regularly assist. Almost all children used toothpaste (96%), but 36% of caregivers did not know if it contained fluoride (8). Higher percentages were reported in a study in Poland where 90.2% of the parents were not aware of the fluoride concentration in their children's toothpaste (9). Another study by Bennadi et al. demonstrated that 72% of caregivers allow their children to use toothpaste for adults containing 1450 ppm, regardless of their age (10). As for studies in Saudi Arabia, one has shown that the majority of the parents were not able to correctly report whether the toothpaste their children used was fluoridated or non-fluoridated (11).

Parents and caregivers have a significant role in the child's oral health and hygiene, and their oral health knowledge and attitude have a significant impact on their children. Insufficient parental knowledge will result in undesirable consequences, and it will affect their children's attitude toward oral health negatively. It has been reported that children whose parents lack awareness and knowledge of oral health have a higher chance to have dental caries (12).

There is limited data among the Saudi population on the knowledge of parents and caregivers on the type of toothpaste their children use, the amount of toothpaste dispensed, and the necessity for supervised tooth brushing. This study assessed the parents' and caregivers' knowledge and perception regarding the use of fluoridated toothpaste in children, the amount of toothpaste applied, and the need for supervised tooth brushing gathered from a sample of children under the age of thirteen years old from different communities in Riyadh, Saudi Arabia.

2. Materials and Methods

2.1. Study Design

This is a cross-sectional study of parents and caregivers of pediatric patients 12 years old and younger attending governmental and private hospitals including King Abdullah Specialized Children's Hospital (KASCH), dental clinics at King Saud bin Abdulaziz University for Health Sciences (KSAUHS), and private dental clinics. The study was approved by the Internal Review Board (IRB) committee at King Abdullah International Medical Research Center (KAIMRC), Saudi Arabia (SP21R/360/06). Surveys were conducted between June 2021 and November 2021 in Riyadh, Saudi Arabia.

2.1.1. Inclusion and Exclusion Criteria

A self-developed questionnaire was validated before the commencement of the study and consents were obtained from parents/caregivers who fit the inclusion criteria. The following inclusion criteria were established: a healthy child who is 12 years old or younger, a parent or a caregiver who is at least 18 years old, and familiar with the child's oral hygiene practices. Parents and patients who did not meet the inclusion criteria or refused to participate were excluded.

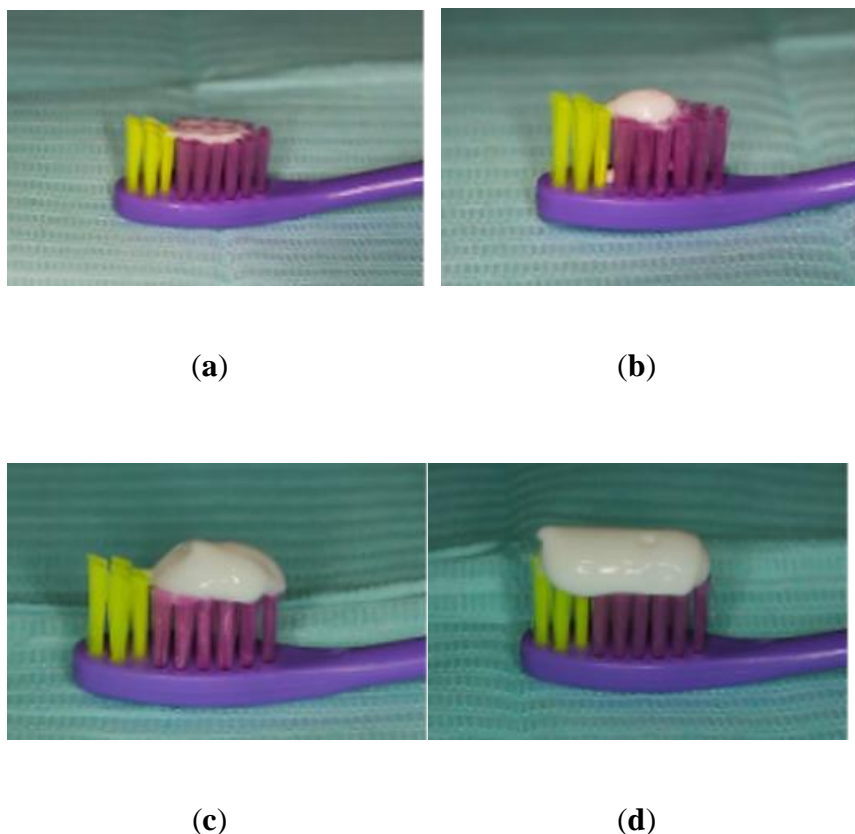
2.1.2. Sample Size and Data Collection

The questionnaires were self-distributed and consisted of 18 items related to demographics, location of data collection, the main criterion for choosing the toothpaste, frequency of toothbrushing, amount of toothpaste used, the concentration of fluoridated toothpaste, and caregiver's supervision. The amount of

toothpaste dispensed was presented to the participants through pictures (smear, pea-size, half-load, and full-load). (Figure 1).

The estimated sample size was calculated to be 385. Participants were involved through a convenient sampling technique.

Figure 1. This figure shows amount of dispensed toothpaste: (a) smear; (b) pea-size; (c) half-load; (d) full-load.



2.1.4. Statistical Analysis

Data analysis was performed using Statistical Package for the Social Sciences (SPSS) 23rd version. Frequency and percentages were used to display categorical variables. Minimum, maximum, mean, and standard deviation were used to display numerical variables. Independent t-test and ANOVA test were used to test for factors associated with participants' knowledge (type of toothpaste, the use of fluoridated toothpaste, fluoride concentration in the toothpaste, frequency of brushing, post-brushing behavior) and perception (main criterion for toothpaste selection, parent's involvement in toothbrushing, type of involvement). Knowledge and perception scores for each participant were calculated based on their answers to the questions: high level if the score was more than 75% of the total score, moderate if the score is between 50-75%, and low if it is less than 50%. The participants' knowledge and perception were further analyzed and associated with the relationship to the child, the age of the caregiver, the caregiver's educational level, the child's gender and age, location of data collection, knowledge level, and perception level. ANOVA test was followed by Tukey post-hoc test to determine where the exact difference between groups exists. The level of significance was set at 0.05.

3. Results

A total of 388 participants were included in the study. The demographic characteristics of survey respondents and their children are described in (Table 1). One hundred eighty-five (47.7%) of the participants were recruited from King Abdullah Specialist Children's Hospital, 89 (22.9%) were recruited from the college of dentistry at King Saud bin Abdulaziz University for Health Sciences, and 114 (29.4%) were recruited from private dental clinics.

Table 1. Demographic profile of the participants (n = 388)

Demographic Characteristics	n	%
Relationship to the child		
Mother	204	52.6
Father	170	43.8
Sibling	10	2.6
Grandparent	1	0.3
Uncle / aunt	3	0.8
Age of the parent / caregiver		
18 - 20 years	5	1.3
21 - 30 years	78	20.1
31 - 40 years	214	55.2
41 - 50 years	87	22.4
51 years and older	4	1.0
Caregiver's education		
Less than high school	33	8.5
High school	119	30.7
Diploma	52	13.4
Bachelor's degree or higher	184	47.4
Child's gender		
Male	180	46.4
Female	208	53.6
Age of the child		
Less than 3 years old	32	8.2
3 - 6 years	179	46.1
7 - 12 years	177	45.6

3.1. Participants' Perception and Knowledge Level

The assessment of participants' perception of the use of fluoridated toothpaste in children is shown in (Table 2). The participants' minimum score was 0, the maximum was 5, and the mean was 1.6 + 1.09 (SD). Only 8.8% chose fluoride concentration as their main criterion for selecting the child's toothpaste, whereas 43.3% of the participants based their choice on the brand. When the participants were asked about their involvement in the children's toothbrushing, 42% never got involved, 13% brush their children's teeth by

themselves, and only 4.9% check their child's teeth after brushing. A low perception level was seen in 79.6% of the participants, 11.1% had a moderate perception level, and only 9.3% had a high perception level.

Table 2. Assessment of participants' perception of the use of fluoridated toothpaste in children (n = 388)

Question	n	%
Do you think treating caries in primary teeth is important?		
Yes	346	89.18
No	28	7.22
Not sure	14	3.61
What is the main criterion for selecting toothpaste for the child?		
Price	33	8.5
Brand	168	43.3
Taste	116	29.9
Fluoride concentration	34	8.8
Media and Advertisement	37	9.5
Do you get involved in the child's teeth brushing?		
Always	101	26
Sometimes	88	22.7
Rarely	36	9.3
Never	163	42
How do you get involved in the child's teeth brushing?		
Remind my child to brush	101	26
Watch my child brush	54	13.9
Brush my child's teeth	51	13.1
Check my child's teeth after brushing	19	4.9
Not involved	163	42
How often are you involved?		
Sometimes	97	25
Most of the time	47	12.1
Always	81	20.9
Not involved	163	42
Perception Score (minimum possible score = 0, Maximum possible score = 5)		

The assessment of participant knowledge of the use of fluoridated toothpaste in children is illustrated in (Table 3). The participants' minimum score was 0, the maximum was 6, and the mean was 2.9 + 1.2 (SD). Fifty seven percent of the parents reported that their children were using children's toothpaste, 51% were unsure whether the toothpaste was fluoridated or not, and 87% were unaware of the fluoride concentration in the used toothpaste. When the participants were asked about the child's oral hygiene practices, 32.5% reported brushing twice a day, 31.4% brushes once a day, and 85.8% reported rinsing with water after toothbrushing. Almost 70% of the participants had a low knowledge level, 29% had a moderate knowledge level, and only 1% had a high knowledge level.

Table 3. Assessment of participants' knowledge of the use of fluoridated toothpaste in children

Question	n	%
What toothpaste does the child use?		
Adult toothpaste	137	35.3
Child toothpaste	221	57
Not sure	30	7.7
Have you ever heard of fluoride?		
Yes	299	77.1
No	73	18.8
Not sure	16	4.1
Does the child use fluoridated toothpaste?		
Yes	137	35.3
No	53	13.7
Not sure	198	51
What is the concentration of fluoride in the child's toothpaste?		
500 ppm	9	2.3
1000 ppm	2	0.5
1450 ppm	6	1.5
Non-fluoridated	33	8.5
Not sure	338	87.1
How many times a day does the child brush his/ her teeth?		
Never	12	3.1
Sometimes but not every day	106	27.3
Once a day	122	31.4
Twice a day	126	32.5
More than twice a day	19	4.9
Not sure	3	0.8
What is the exact amount of toothpaste the child uses?		
Smear-size picture	20	5.2
Pea-size picture	141	36.3
Half-load picture	156	40.2
Full-load picture	42	10.8
Not sure	29	7.5
What does the child do after teeth brushing?		
Rinse with water	333	85.8
Spit out without rinsing	12	3.1
Swallow toothpaste while brushing	24	6.2
Not sure	19	4.9
Knowledge Score (minimum possible score = 0, Maximum possible score = 7)		

3.2. Factors Associated with Knowledge and Perception

Different variables were associated with the participants' knowledge and perception of the use of fluoridated toothpaste in children (Table 4). Relationship to the child showed a significant difference where mothers had a higher knowledge and perception score compared to fathers; other caregivers (siblings, grandparents, and uncles/aunts) were excluded since they only compromised 3.7% of the total number of the study participants. The age of the caregiver was only significantly associated with the perception; those aged between 21 – 30 years had a significantly higher perception score compared to older participants. Participants' educational level was significantly associated with the knowledge and perception scores, the higher the educational level, the higher the score. The child's gender and age were significantly associated with both scores; participants with female children had significantly higher knowledge and perception scores compared to those with male children. The overall perception level was also significantly associated with the knowledge score where it was observed that the higher the perception level, the higher the knowledge score (P= 0.009).

Table 4. Factors associated with knowledge and perception of the use of fluoridated toothpaste in children

Factor	Knowledge Score			Perception Score		
	Mean	Standard deviation	P-Value	Mean	Standard deviation	P-Value
Relationship to the child						
Mother	3.07	1.10	0.004*	1.80	1.19	< 0.001*
Father	2.71	1.29		1.38	0.94	
Age of the parent / caregiver						
18 - 20 years	2.4	0.89	0.619	1.2	0.45	0.029*
21 - 30 years	2.85	1.15		1.87	1.22	
31 - 40 years	2.97	1.27		1.61	1.07	
41 - 50 years	2.82	1.10		1.37	1.00	
51 years and older	2.5	0.58		1	0.00	
Caregiver education						
Less than high school	2.30	1.29	< 0.001*	1.24	0.61	< 0.001*
High school	2.58	1.29		1.29	0.91	
Diploma	3.02	1.15		1.75	1.28	
Bachelor's degree or higher	3.18	1.06		1.82	1.14	
Child gender						
Male	2.74	1.29	0.014*	1.38	0.91	< 0.001*
Female	3.04	1.11		1.78	1.19	
Age of the child						
Less than 3 years old	2.13	1.24	< 0.001*	2.31	1.31	< 0.001*
3 - 6 years	2.92	1.10		1.72	1.17	
7 - 12 years	3.02	1.25		1.34	0.87	
Location of data collection						
King Abdullah Specialist Children Hospital	2.66	1.26	0.001*	1.47	1.02	0.088
College of Dentistry at King Saud bin Abdulaziz University for Health	3.16	1.21		1.71	1.03	

Sciences				
Private clinics	3.08	1.03	1.72	1.22

* Significant at level 0.05

3.3. Participants' Involvement and Amount of Toothpaste Used Across Different Children's Age Groups

There was a difference in participants' involvement in their children's teeth brushing (Table 5). In children less than 3 years of age, only 43.8% of the participants were always involved in their children's toothbrushing and 34.4% were never involved. Of those who were involved, 71.4% brushed their children's teeth by themselves, and the remaining participants were involved either by watching or reminding their children to brush. For children between the age of 3 and 6, 26.8% of the participants were never involved, and 31.8% were always involved with the majority reminding their children to brush. As for the participants with children who are 7-12 years of age, 58.8% were never involved in their children's toothbrushing, and of those who were involved, 61.6% reminded their children to brush. Different amounts of toothpaste used were linked to different age groups. Only 21.9% of children younger than 3 years old were using the correct amount (smear), whereas 37.5% of the participants were dispensing a pea-sized amount, 15.6% dispensing an amount of a half load, 9.4% dispensing a full load, and 15.6% were unsure of the amount dispensed. For children 3-6 years old, 46.4% of the participants dispensed the recommended amount (pea-size) and 38.5% dispensed an amount equal to a half load. Forty-six percent of participants with children between the ages of 7-12 had reported dispensing a half load amount of toothpaste, 26% had dispensed a pea-sized amount, and almost 10% were not aware of the exact amount.

Table 5. The difference in participants' involvement and amount of toothpaste used across different children's age groups

Factor	Age of the Child		
	Less than 3 years old	3 - 6 years	7 - 12 years
Do you think treating caries in primary teeth is important?			
Always	14 (43.8%)	57 (31.8%)	30 (16.9%)
Sometimes	5 (15.6%)	54 (30.2%)	29 (16.4%)
Rarely	2 (6.3%)	20 (11.2%)	14 (7.9%)
Never	11 (34.4%)	48 (26.8%)	104 (58.8%)
How do you get involved in the child's teeth brushing?			
Remind my child to brush	2 (9.5%)	54 (41.2%)	45 (61.6%)
Watch my child brushing	4 (19%)	37 (28.2%)	13 (17.8%)
Brush my child's teeth	15 (71.4%)	32 (24.4%)	4 (5.5%)
Check my child's teeth after brushing	0 (0%)	8 (6.1%)	11 (15.1%)
What is the exact amount of toothpaste the child uses?			
Smear-size picture	7 (21.9%)	10 (5.6%)	3 (1.7%)
Pea-size picture	12 (37.5%)	83 (46.4%)	46 (26%)
Half-load picture	5 (15.6%)	69 (38.5%)	82 (46.3%)
Full-load picture	3 (9.4%)	10 (5.6%)	29 (16.4%)
Not sure	5 (15.6%)	7 (3.9%)	17 (9.6%)

4. Discussion

The primary aim of this study was to assess the knowledge and perception of parents and caregivers regarding their children's oral health for those who are residing in Riyadh, Saudi Arabia. Parents have a significant role in their children's oral hygiene practices and attitudes and thus they should be instructed to perform proper dental care for their children. Children's oral health will ultimately be affected by parents' low level of oral health awareness. The lack of parental knowledge on the amount of toothpaste to use and on the proper fluoride concentration seems to be a common problem (13,14). Therefore, parental education on oral health plays a crucial role in caries prevention in preschool children and it has been proven to be effective in reducing the incidence of caries (15-18).

4.1. Fluoridated Toothpaste

Although a high percentage of participants (77.1%) have heard about fluoride in toothpaste, 51% were unsure whether the child's toothpaste contained fluoride or not. Findings from another study conducted in Riyadh showed that 51.2% of the participants provided fluoridated toothpaste, but 36.7% do not know if the toothpaste used by their children contained fluoride (19). One of the limitations of this study is the possibility of inaccurate self-reporting of the toothpaste used. Data from Alshehri et al. suggested that self-reported use of fluoridated toothpaste was low (29.2%) in comparison to the actual type (55.9%) based on the information obtained from the manufacturers (11). Participants' use of fluoridated toothpaste in the present study is low (35.3%) which is similar to Alshehri et al. findings (29.2%), but much lower than the findings reported by Avenetti et al. (50.4%) and Opydo-Szymaczek et al. (93%) (11,8,20). Such findings mandate the incorporation of oral hygiene instructions including the type of toothpaste that is recommended for each age group.

4.2. Fluoride Concentration

Fluoride toothpaste with 1,000 parts per million or more reduces dental cavities in both the permanent and primary dentition, according to evidence of moderate to high certainty (4). Eighty-seven percent of the participants did not know the exact concentration of fluoride in the toothpaste. This suggests that they have limited knowledge about fluoride and thus interventions are needed to further educate them about the current guidelines and recommendations for the use of fluoridated toothpaste for optimum caries prevention and minimizing the risk of fluorosis. When participants were asked about the type of toothpaste, 57% reported the use of children's toothpaste, 35% were using adult toothpaste, and the remaining were unsure. Findings from Bennadi et al. showed a higher percentage (72%) of participants using adult toothpaste for preschool children in contrast to Elkarmi et al. where 82.5% reported using children's toothpaste (10,21). Parental education is essential to ensure proper toothpaste selection.

4.3. Amount of Toothpaste

Recommendations had been established concerning the amount of toothpaste to be dispensed; a smear or a rice-sized amount of fluoridated toothpaste for children under the age of 3 and a pea-sized amount of fluoridated toothpaste is appropriate for children between 3 and 6 years old (6). Avenetti et al. reported that 32.8% of children less than 3 years old used pea size, and 55.7% used smear size (8). Another study in Poland reported that children aged 4 to 7 years old used a smear to pea-sized amount in 60% of the participants, with the remaining using half load to full load quantity (20). In contrast, data from the present study showed that only 21.9% of children less than 3 years old and 46.4% of children between the age of 3-6 years old used the recommended amount of toothpaste. These results may indicate the misconception parents have regarding the amount of toothpaste that is required for the anti-caries effect. Anticipatory

guidance and oral health promotion programs will further educate the community regarding the best clinical recommendations.

4.4. Parental Supervision

Evidence-based reviews show that fluoridated toothpaste reduces dental caries in children; the benefit is stronger in children with higher baseline caries levels, higher fluoride concentrations in the toothpaste, more frequent usage, and supervision (3,4). Although parental supervision is crucial, especially to young children, only 43.8% of the participants with children less than 3 years of age are always involved in their children's brushing, whereas 34.4% never get involved. For children between the ages of 3 and 6, an almost equal number of participants were either always or sometimes involved, 31.8% and 30.2% respectively. For older children aged from 7-12 years old, less involvement has been reported with almost 59% being never involved. Avenetti et al. reported that only 19% of caregivers had someone help the children brush only sometimes or not at all, whereas Bennadi et al reported that 83% of preschool children were not supervised which comes in agreement with Elkarmi et al. where 78% of the parents did not brush their children's teeth by themselves (8,10,21). Young children lack the needed manual dexterity required for proper brushing and their inability to completely expectorate the toothpaste, hence supervised toothbrushing is necessary.

4.5. Toothbrushing Frequency

Children brushing their teeth twice daily with fluoridated toothpaste and oral hygiene instructions are the keystone for the caries prevention program (22). The frequency of teeth brushing has played a crucial role in decreasing caries. A study conducted in Riyadh, Saudi Arabia by Alyousef et al. stated that 54.5% of the children brushed their teeth once, and 45.5% brushed twice (23). In contrast to the present study, only 32.5% of the participants reported brushing twice a day and 31.4% once. Based on experts' opinions and recommendations to ensure the highest fluoride intake and efficacy, children should minimize rinsing with water after brushing (22). Binahmed et al. reported that 79% of caregivers think that a child should rinse their mouth after brushing (24). Findings from this study showed that the majority of participants (85.8%) rinsed with water after brushing, similar to the findings reported by Bennadi et al. (84%) (10).

4.6. Knowledge and Perception Level

The relationship between knowledge and perception with caregivers' educational level was found to be statistically significant. Similarly, a study in Italy reported that children of mothers with low educational levels showed a high prevalence of caries (87.2%) in contrast to those with higher educational levels (55.4%) (25). Chen et al. stated that parents with higher educational levels had greater oral health awareness than other parents, and their children displayed better dental hygiene habits, which is in agreement with the findings of this study (26).

The data also shows that mothers are significantly higher in knowledge and perception scores compared to fathers which are in contrast to Alshehri et al. findings (11). The overall knowledge score was low (69.7%) among caregivers in the present study with similar findings to Alshehri et al. (11). The location of data collection and knowledge score showed statistically significant results. Higher knowledge scores were observed from participants attending the college of dentistry compared to participants at private dental clinics and King Abdullah Specialist Children's Hospital. More emphasis should be directed towards providing an oral health education component not just during the dental visits but also during the child's well visits with their pediatrician or medical provider.

5. Conclusions

Findings in the present study suggest that there is a lack of awareness of proper guidelines for the selection and usage of toothpastes in children. Parents should be motivated to supervise and assist their children's brushing using the proper toothpaste appropriate for their age. The level of parental awareness is highly associated with their offspring's quality of life in different aspects including oral health. More emphasis should be placed on increasing parental attitude and knowledge, which will positively reflect on their children's oral health status.

Disclaimers:

Source(s) of support: This study has not received any external funding.

References

1. Casamassimo PS, Thikkurissy S, Edelstein BL, Maiorini E. Beyond the dmft: the human and economic cost of early childhood caries. *The Journal of the American Dental Association*. 2009 Jun 1;140(6):650-7.
2. Al Agili DE. A systematic review of population-based dental caries studies among children in Saudi Arabia. *The Saudi dental journal*. 2013 Jan 1;25(1):3-11.
3. Marinho VC, Higgins J, Logan S, Sheiham A. Fluoride toothpastes for preventing dental caries in children and adolescents. *Cochrane database of systematic reviews*. 2003(1).
4. Walsh T, Worthington HV, Glenny AM, Marinho VC, Jeroncic A. Fluoride toothpastes of different concentrations for preventing dental caries. *Cochrane database of systematic reviews*. 2019(3).
5. Dos Santos AP, Nadanovsky P, de Oliveira BH. A systematic review and meta-analysis of the effects of fluoride toothpastes on the prevention of dental caries in the primary dentition of preschool children. *Community dentistry and oral epidemiology*. 2013 Feb;41(1):1-2.
6. Wright JT, Hanson N, Ristic H, Whall CW, Estrich CG, Zentz RR. Fluoride toothpaste efficacy and safety in children younger than 6 years: a systematic review. *The Journal of the American Dental Association*. 2014 Feb 1;145(2):182-9.
7. Scottish Intercollegiate Guidelines Network (SIGN). Dental interventions to prevent caries in children. Edinburgh: SIGN; 2014. (SIGN publication no. 138). [March 2014]. Available from URL: <http://www.sign.ac.uk>
8. Avenetti D, Lee HH, Pugach O, Rosales G, Sandoval A, Martin M. Tooth brushing behaviors and fluoridated toothpaste use among children younger than three years old in Chicago. *Journal of dentistry for children*. 2020 Jan 15;87(1):31-8.
9. Turska-Szybka A, Świątkowska M, Walczak M, Olczak-Kowalczyk D. What do parents know about the use of fluoride products in children? a questionnaire study. *Fluoride*. 2018 Apr 1;51(2):114-21.
10. Bennadi D, Kshetrimayum N, Sibyl S, Reddy CV. Toothpaste utilization profiles among preschool children. *Journal of clinical and diagnostic research: JCDR*. 2014 Mar;8(3):212.
11. Alshehri M, Kujan O. Parental views on fluoride tooth brushing and its impact on oral health: A cross-sectional study. *Journal of International Society of Preventive & Community Dentistry*. 2015 Nov;5(6):451.
12. Vanagas G, Milašauskienė Ž, Grabauskas V, Mickevičienė A. Associations between parental skills and their attitudes toward importance to develop good oral hygiene skills in their children. *Medicina*. 2009 Sep;45(9):718.

13. Poutanen R, Lahti S, Tolvanen M, Hausen H. Parental influence on children's oral health-related behavior. *Acta Odontologica Scandinavica*. 2006 Jan 1;64(5):286-92.
14. Lima CV, Pierote JJ, de Santana N, Alves H, de Deus Moura de Lima M, de Deus M, de Fátima Almeida L, de Moura MS. Caries, toothbrushing habits, and fluoride intake from toothpaste by Brazilian children according to socioeconomic status. *Pediatric Dentistry*. 2016 Jul 15;38(4):305-10.
15. Rong WS, Bian JY, Wang WJ, De Wang J. Effectiveness of an oral health education and caries prevention program in kindergartens in China. *Community dentistry and oral epidemiology*. 2003 Dec;31(6):412-6.
16. Harrison R, Benton T, Everson-Stewart S, Weinstein P. Effect of motivational interviewing on rates of early childhood caries: a randomized trial. *Pediatric dentistry*. 2007 Jan 1;29(1):16-22.
17. Tinanoff N, Reisine S. Update on early childhood caries since the Surgeon General's Report. *Academic pediatrics*. 2009 Nov 1;9(6):396-403.
18. Kulkarni GV. Long-term effectiveness of parent education using the “baby oral health” model on the improvement of oral health of young children. *International Journal of Dentistry*. 2013 Nov 10;2013.
19. Salama F, Alwohaibi A, Alabdullatif A, Alnasser A, Hafiz Z. Knowledge, behaviours and beliefs of parents regarding the oral health of their children. *European Journal of Paediatric Dentistry*. 2020 Jun 1;21(2):103-9.
20. Opydo-Szymaczek J, Ogińska M, Wyrwas B. Fluoride exposure and factors affecting dental caries in preschool children living in two areas with different natural levels of fluorides. *Journal of Trace Elements in Medicine and Biology*. 2021 May 1;65:126726.
21. ElKarmi R, Shore E, O'Connell A. Knowledge and behaviour of parents in relation to the oral and dental health of children aged 4–6 years. *European Archives of Paediatric Dentistry*. 2015 Apr;16(2):199-204.
22. Toumba KJ, Twetman S, Splieth C, Parnell C, Van Loveren C, Lygidakis NA. Guidelines on the use of fluoride for caries prevention in children: an updated EAPD policy document. *European Archives of Paediatric Dentistry*. 2019 Dec;20(6):507-16.
23. Alyousef AM, Almehrej BA, Alshahrani MA, Almutairi KM, Alqasir MA, Alassaf A, Almulhim B, Alghamdi S, Mallineni SK. Arabian Parents Knowledge, Attitude, and Practice towards their Childrens Oral Health and Early Childhood Caries Resided in Riyadh Province: An Online-Based Cross-Sectional Survey. *Annals of Medical and Health Sciences Research*. 2021 Nov 16.
24. Yasir Binahmed, Abdulmajeed Alrumi, Abdulelah Alobathani, Sliuman Alnashwan, Ibrahim Alhumud, Jaser Ahmed Alghamdi, Assessing Caregivers Knowledge, Attitude and Practices Regarding their Children Oral Health and Hygiene in Saudi Arabia, *J Res Med Dent Sci*, 2022, 10(1): 64-70
25. Cianetti S, Lombardo G, Lupatelli E, Rossi G, Abraha I, Pagano S, Paglia L. Dental caries, parents educational level, family income and dental service attendance among children in Italy. *Eur J Paediatr Dent*. 2017 Mar 1;18(1):15-8.
26. Chen L, Hong J, Xiong D, Zhang L, Li Y, Huang S, Hua F. Are parents' education levels associated with either their oral health knowledge or their children's oral health behaviors? A survey of 8446 families in Wuhan. *BMC Oral Health*. 2020 Dec;20(1):1-2.