

# Evaluation of the knowledge, attitude and practice of pediatricians about pediatric oral disease: A systematic review

ALIREZA K. MOTAMEDI, ALIREZA NEGAHI, SEYED HAMZEH MOUSAVIE, HAMED VASEGHI, MOHAMMAD NASIRI\*

*Department of Surgery, Rasool E\_Akram Hospital, Iran University of Medical Science, Tehran, Iran*

*\*Corresponding author: Mohammad Nasiri, Department of Surgery, Rasool E\_Akram Hospital, Iran University of Medical Science, Tehran, Iran, Email: moham.nasiri@gmail.com, Tel: +989121763489*

## ABSTRACT

**Background and Aim:** Tooth decay is so common in children that about 60 to 90% of children worldwide are affected by this disorder. Despite the prominent role of pediatricians in children's oral health, their knowledge of oral diseases has been reported to be low. Therefore, in this systematic review, the results of studies on the level of knowledge, attitude and practice of pediatricians about oral diseases in children were evaluated.

**Material and Methods:** The process of preparing this research was done according to the preferred cases in the report of systematic review articles and meta-analysis (PRISMA). The data of each article were categorized and extracted based on the author, year, journal, place of publication, number of samples (pediatricians), findings and conclusion. Studies were selected between 2006 and 2020. Almost new studies were explored based on geographical distribution from almost all different parts of the world. Articles examining the knowledge, attitudes, and practices of residents and pediatricians (2006-2020) were selected. Finally, 13 articles were selected in which a questionnaire containing common questions was used. Finally, descriptive analysis of the data was performed using SPSS software 13.

**Results:** Despite the good knowledge of pediatricians about the symptoms and causes of dental caries in children, a high percentage of pediatricians (78.7%) reported that the level of their education in children's oral health was insufficient. Furthermore, 2.5% of pediatricians believed that tooth decay in children can be prevented. The results of this study showed that only 35.5% of pediatricians evaluated fluoride intake.

**Conclusion:** The results of this review showed that despite the positive attitude and belief of pediatricians regarding their responsibility in preventing tooth decay in children, they do not have enough self-confidence to do due to insufficient education in identifying and recognizing its effective factors.

**Keywords:** knowledge, attitude, practice, pediatricians, Pediatricians, Pediatric oral health professionals.

---

## INTRODUCTION

Oral health of children can affect their general health and the economic situation of society (1). Tooth decay is so common in children compared to other diseases that nearly 60 to 90% of children worldwide are affected by tooth decay (2). Untreated tooth decay becomes cavities that can eventually be associated with pain, eating and chewing problems, weight and growth loss, as well as decreased self-esteem and social interaction in the child (2). Several research studies have reported that the pain caused by tooth decay leads to physical absence and concentration of the child in the classroom (3). Early childhood dental decay is the result of a bacterial infection that is often transmitted from mother to child and usually occurs when the first tooth erupts between 6 months and the first year of a child's life (4). Excessive consumption of fluids and foods containing sugar, excessive breastfeeding after the first tooth eruption are among the main risk factors early childhood dental decay (2). The average cost of treating a child with decayed teeth in Canada is about \$ 700 to \$ 3,000, and this figure is higher if other medical expenses are added (5). Tooth decay is a preventable disease if treated early, otherwise it can cause pain, bacteremia, developmental disorders, early childhood dental decay and speech disorders (6). The participation of different specialties in this field can be effective in increasing awareness and prevention of oral diseases. The role of pediatricians in oral health was recognized in 2003 in a policy developed by the US Academy of Pediatrics (7). According to this law, prevention and education can be the two main pillars in promoting children's oral health. In fact, pediatricians teach

their parents the responsibility of preventing oral diseases of children. Pediatricians, as the first line of communication between children and health issues, can inform parents in the early stages of tooth decay and refer them to dental centers. Parents of children, especially their mothers, have been in contact with a pediatrician before eruption of their child's teeth, therefore, they can have ample opportunity to learn and succeed in preventing their child's tooth decay through adequate training by specialists (8).

Pediatricians can also play an important role in changing parents' knowledge and attitudes toward oral hygiene by educating parents about issues such as poor eating habits and dental care (8). Therefore, the level of knowledge of pediatricians about oral diseases is necessary to achieve good oral health of children (9). The United States Academy of Pediatrics has developed an overall health education strategy for children's oral health care, which should start with a pediatrician (10).

According to the United States Academy of Pediatrics (AAP), every child from birth to one year of age must be seen by a pediatrician at least eight times (10). Despite the prominent role of pediatricians in the field of pediatric oral health, the level of knowledge and education of pediatricians about oral diseases has been reported to be low in most parts of the world (12).

In 1998, the knowledge, attitude and practice of pediatricians in the field of pediatric oral health have been evaluated for the first time (11). While pediatricians believe that oral health can be an important aspect of their medical practice, few have reported their activity and practice on children's oral health. Since 2003, the positive role of

pediatricians in children's oral health has been included in the US National Institutes of Health (12). Since the level of bacteria associated with dental cavities (*Streptococcus mutans* and *Streptococcus sobrinus*) in the mother's mouth is directly related to the level of these bacteria in the mouth of their child. Therefore, educating pediatricians to reduce the level of this bacterium in mothers can be capable of controlling child's tooth decay (12).

Therefore, the most important factor affecting the prevention of oral diseases is the knowledge and practice of pediatricians and other medical groups related to children (13). Despite the high prevalence of early childhood dental decay, the knowledge of pediatricians about this issue is poor. The results of several previous studies show that the level of knowledge and awareness of pediatricians about oral diseases is limited (11). Caspary et al. (2008) reported that the level of education of pediatric residents in the United States in the field of oral health was insufficient (14). Despite the global demand for pediatric oral health promotion by pediatricians, with the exception of a scoping review by Dickson-Swift et al. (2020), there is no comprehensive review of the role of pediatricians in oral health (15).

Therefore, in this systematic review, for the first time, the results of several studies conducted in different parts of the world (2006-2020) were evaluated to assess the level of knowledge and practice of pediatricians in children's oral health.

**Operational Definitions:** Knowledge: means a theoretical or practical understanding of the subject. Attitude: A positive or negative talent or desire for a particular idea, object, person, or situation. Practice: The practical use of knowledge or practical approach to a particular subject.

## MATERIALS AND METHODS

The process of preparing this research was done according to the preferred cases in the report of systematic review articles and meta-analysis (PRISMA) (15). The data of

each article were categorized and extracted based on the author, year, journal, place of publication, number of samples (pediatricians), findings and conclusion. Studies were selected between 2006 and 2020. Almost new studies were explored based on geographical distribution from almost all different parts of the world.

**Data sources:** Using 5 databases including Medline, OVID, CINAHL, CINAHL and Embase, 420 published articles on the knowledge, attitude and practice of oral health professionals were downloaded in FullPDF by Google Scholar search engine. Keywords and phrases included pediatricians, children's oral health, parent education, education of pediatric residents, level of knowledge and knowledge, attitude and practice of pediatricians.

**Inclusion criteria:** Only articles conducted between 2006 and 2020 were included in which the knowledge, attitude and practice of residents and pediatricians were considered. Finally, 13 articles in with questionnaire containing common questions was selected to prepare a systematic review article (Figure 1). In the selected articles, questionnaires were used to collect data. These questionnaires include various sections such as: sociological characteristics, function of pediatricians, questions for estimating the knowledge and expertise of specialists (i.e., information about tooth decay and gingivitis and the final section containing questions related to the attitude of specialists regarding children's oral health. **Exclusion criteria** include research conducted prior to 2006 or research related to knowledge, attitudes, and practices of individuals about children's oral diseases other than pediatricians.

**Statistical analysis:** I should mention that some of these studies reported one of the parameters of knowledge, attitude or practice of experts. In some papers all three parameters were measured. Finally, descriptive data analysis was performed using SPSS software version 13.

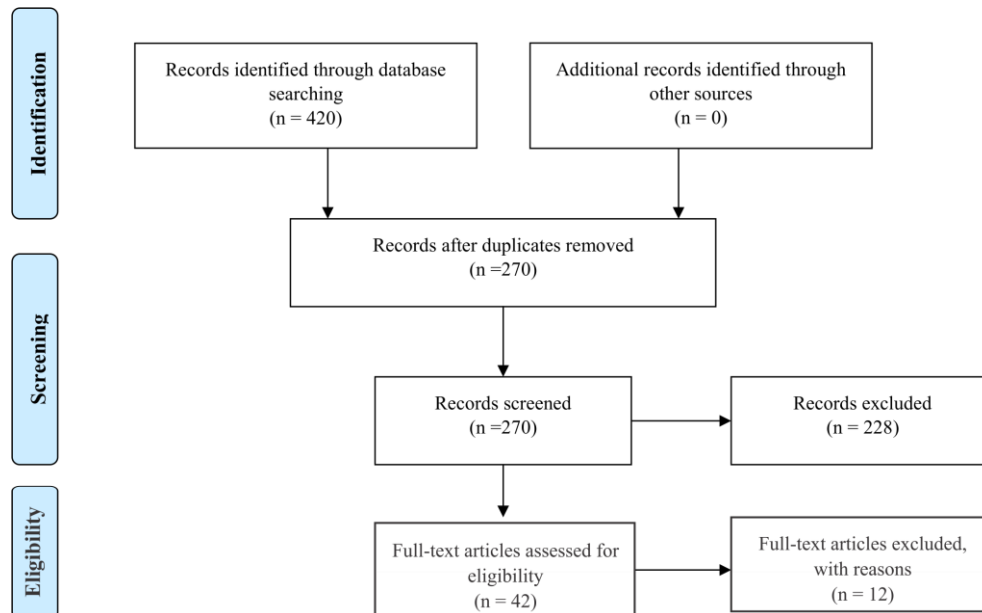


Figure 1: Flow of information through the different phases of the PRISMA steps

<b>Table 1: Summary of the Reviewed Articles.</b>						
<b>First Author, Year &amp; Journal.</b>	<b>Study Design</b>	<b>Study Participants, Country</b>	<b>Sample size &amp; rate</b>	<b>Measured Outcomes</b>	<b>Findings</b>	<b>Suggestions</b>
Di Giuseppe et al., 2006. <i>BMC Public Health</i>	Cross Sectional self-completed questionnaire	Pediatricians, Italy	N= 1000 (50.7%)	Knowledge, attitude and practices	Higher knowledge about the main risk factors can important role in preventing oral diseases	There is need for more awareness for pediatricians and recommended a dental visit once a year
Caspary et al., 2008. <i>Pediatrics</i>	Cross Sectional self-completed questionnaire	Graduating pediatric residents, USA	N= 1000 61.1%)	Self-confidence in Oral Health Assessment Skills	Oral health training during residency can promote pediatrician confidence in oral health tasks	There is urgent need for Oral health training during residency
Herndon et al., 2010. <i>The Journal of Pediatrics</i>	self-completed administered questionnaire	Pediatricians and Family Physicians, USA	N= 3943 (69%)	Knowledge, Confidence and Practices	Training can promote confidence in performing oral health practices in Pediatricians and family physicians	Oral health educational programs is needed for pediatricians and family physicians to significantly reduce the prevalence of early childhood caries.
Balaban et al., 2012. <i>International Journal of Paediatric Dentistry</i>	Cross Sectional self-completed questionnaire	Pediatricians & residents, Brazil	N= 186 (87.3%)	Knowledge	Majority believed that their knowledge on oral health to be insufficient	Information about oral health should be included in medical curricula and residency
Bozorgmehr et al., 2012. <i>J Oral Health Oral Epidemiol</i>	Cross Sectional self-completed questionnaire	Pediatricians & residents, Iran	N= 75 (80%)	Knowledge, attitude, and practices	The respondents had good Attitude but less than half of them knew all the main risk factors of dental caries	Programs should be employed to increase the Pediatricians awareness about oral health
Sezer et al., 2013. <i>Paediatr Child Health</i>	Cross Sectional self-completed questionnaire	Paediatricians & paediatric Residents, Turkish	N= 1118 (40%)	Knowledge, training, attitudes and practices	After adjusting for the oral health education, pediatricians referred patients to a dentist.	The lack of dental knowledge and training in residency limits the paediatricians' role in promoting children's oral health in daily practice
Kalkani et al., 2013. <i>Eur Arch Paediatr Dent</i>	web application survey questions	postgraduate (PG) paediatric, UK	N= 479 (15%)	Knowledge, training and attitudes	The study revealed that lack of training and up-to-date information in postgraduate (PG) paediatric, appears to limit their role in prevention of oral disease at an early stage	There is need for include pediatricians training in undergraduate curriculum.
Indira et al., 2015. <i>International Journal of Clinical Pediatric Dentistry</i>	Cross Sectional self-completed questionnaire	Pediatricians, India	N= 3180 (80.8%)	Knowledge, Attitude and Practice	Most of them were less aware of the first dental visit including early childhood caries.	There is need for health educative programs In pediatricians in undergraduate curriculum
Eke et al., 2015. <i>BMC Oral Health</i>	Cross Sectional self-completed questionnaire	Pediatricians, Nigeria	N= 108 (89.3 %)	Perception and awareness	Majority of the pediatricians had limited knowledge about some basic oral health care in children.	It is recommended continuous education and training about oral children healthcare in pediatricians in undergraduate curriculum
Nassif et al., 2017. <i>International Journal of Clinical Pediatric Dentistry</i>	Cross Sectional self-completed questionnaire	Pediatricians, Lebanon	N= 100 (100 %)	Awareness	The Lebanese pediatricians have an acceptable level of knowledge in children's oral health.	This study reveals that require immediate attention in pediatricians should be better informed about oral issues.

Dima et al., 2018.	Cross Sectional self-completed questionnaire	Pediatricians and dentists, Taiwan	N= 315 (95.5 %)	knowledge, attitude, and practice	Pediatricians had lower knowledge relation to early childhood caries (ECC).	Pediatricians had a more positive attitude about ECC prevention, when they had a higher level of knowledge
Int. J. Environ. Res. Public Health						
Tikare et al., 2019.	Cross Sectional self-completed questionnaire	Pediatricians, Saudi Arabia	N= 61 (100 %)	Knowledge and Practice	Pediatricians had good knowledge about early childhood caries (ECC) and pediatric oral health.	Despite good knowledge, There is an increased need for continuing education programs on relevant topics among pediatricians to bridge the knowledge gaps.
Journal of Dental Research and Review						
Golubović et al., 2020.	Cross Sectional self-completed questionnaire	Pediatricians, Bosnia and Herzegovina	N= 84 (86 %)	Knowledge, Attitude and Practice	The pediatricians had positive attitudes but insufficient knowledge about caries prevention and the oral diseases.	There is need to educational intervention about oral diseases and maintain close relationship between pediatricians and dentist.
Balkan Journal of Dental Medicine						

Results Data from 13 articles published from different countries were evaluated in this study (Table 1). Of the 13 selected articles, some reported only the knowledge and awareness of specialists and others reported all three parameters of knowledge, attitude and practice of pediatricians.

About 80 percent of the participants were pediatricians and about 20 percent were pediatric residents. The extent of knowledge, attitude and practice of pediatricians in relation to oral diseases is shown in Table 2. Furthermore, 2. 90.1% of pediatricians disagreed with the statement that children fed glass or baby bottles only get tooth decay. The results show that 61.9% of pediatricians answered correctly to a question entitled the caries-producing oral bacteria can be transmitted from mother to child. According to dental data, the presence of white spots on the tooth surface can be an early sign of tooth decay, which about 50% of pediatricians have commented on this issue correctly. A high percentage of participants (90%) mentioned that inadequate brushing can be a risk factor for early tooth decay in children. Nearly 100 % of participants (95%) reported that consuming sweet

liquids can lead to tooth decay in children. A high percentage of pediatricians (78.7%) reported that their level of education in the field of children's oral health was insufficient. Furthermore, 88.5% of the participants answered that using toothpaste containing fluoride can prevent tooth decay. Moreover, 92.5% of pediatricians believe that tooth decay in children can be prevented. Also, 59% of pediatricians believe that they can play an effective role in preventing oral caries in children. In addition, 56% of pediatricians ask and advise parents about baby bottles or feeding bottles. Additionally, 60.3% of the participants in this review study stated that they perform children's oral examinations to diagnose dental caries.

The results of this study show that only 35.5% of pediatricians evaluate fluoride intake. A high percentage of participants (73.3) stated that they advise parents of children about brushing teeth. Fifty-eight percent of pediatricians report that they refer children to dental care centers if necessary.

Furthermore, 40.7% of pediatricians have provided health education to parents to prevent tooth decay.

<b>Table 2:</b> Assessment of knowledge, attitude and practice of the pediatricians in the field of pediatric oral diseases. (Data presented as percent)			
	Knowledge, n= 3276		
	agreed	disagreed	unsure
Only bottle-fed babies get tooth decay	6.4	90.1	3.5
The bacteria that cause dental decay can be transmitted from mother to child	61.9	19.4	18.7
White spots on the teeth may indicate initial sign of early dental decay	50.2	22.0	27.8
Carbonated drinks and juice are harmful to teeth	95.0	2.8	2.2
Education of pediatricians is inadequate in the field of oral health of children	78.7	17.3	4.0
Fluoride prevents tooth decay when applied topically to the surfaces of the teeth	88.5	5.2	6.3
	Attitude, n= 820		
	agreed	disagreed	unsure
Early childhood dental decay is preventable.	92.5	3.8	3.7
Pediatricians can have an important role in preventing oral diseases	59.0	20.9	20.1
	Practice, n= 1640		
	Yes	No	
Inquire about baby feeding bottle	56.0	44.0	
Examine children's teeth for early dental decay	60.3	39.7	
Assessment intake of fluoride in children	35.5	64.5	
Provide counseling on tooth brushing	73.3	26.7	
Referral of patients (children) to dental health care	58.0	32.0	
Health education to mothers on prevention of caries	40.7	59.3	

## DISCUSSION

This study is the first systematic review of the knowledge, attitude and practice of pediatricians in the field of pediatric oral diseases. A Scoping Review by Dickson-Swift et al (2020) examines the knowledge and practice of pediatricians about children's oral health (15). In this systematic review research, the results of previous studies are combined and the research result is synthesized using statistical methods. In this way, a single and specific estimate is obtained in response to the research question, which has a high power and validity in the conclusion and has more generalizability. All 13 selected previous studies for the present review study were cross-sectional and data were collected through a questionnaire filled out by participants. Moreover, 90.1% of pediatricians disagreed that children fed glass or bottles only develop tooth decay. This is consistent with the results of a study by Sezer et al. (2013) and Lewis et al. (2000) that this figure was reported to be close to 80% (16, 17).

The results of many studies show that breastfeeding, especially free-pattern feeding, can cause tooth decay in children (18). Although bottle-fed children alone do not suffer from early tooth decay, glass-feeding, especially at night, can be an important factor in the development of early childhood tooth decay in children (19, 20). Furthermore, 76% of pediatricians were unaware of the relationship between baby bottle nutrition and tooth decay (21). Bowen and Lawrence (2005) reported that breast milk was more likely to cause tooth decay in children than cow's milk (22). According to the American Academy of Pediatrics, the number of breastfeeding sessions after one year should be limited to twice a day. According to the review, 61.9% of pediatricians stated that the caries-producing oral bacteria can be transmitted from mother to child. A similar finding by Balaban et al. (2012) and Saudi Arabia (2019) reported that more than 50% of pediatricians are aware of the bacterium involved in caries and its transmission from mother to child (23, 24). In contrast, research by Nassif et al. (2017) and Sandalli et al. (2007) found that less than 50% (about 46%) were aware of the transmission of caries-producing oral bacteria from mother to child (19, 25).

Adequate knowledge and education of pediatricians regarding the causes of early childhood tooth decay can reduce tooth decay incidence and reduce pediatric referral to the dentist (26, 27). According to dental data, the presence of white spots on the surface of the tooth can be an early sign of tooth decay, when about 50% of pediatricians have commented on this issue. This result is consistent with the report of a previous study by Prakash et al. (2006) (20). But in a study by Balaban et al. (2012), a very low percentage of pediatricians diagnosed pediatric tooth decay through white spots on children's teeth (23). In contrast, Tikare et al. (2019) found that approximately 80% of pediatricians were aware of the association between white spots and tooth decay (24). Lack of knowledge of pediatricians about the relationship between white spots on the teeth and the occurrence of tooth decay can be due to inadequate training of practitioners during general and specialized education (28). Fahimzad et al. (2015) and Nasiri et al. (2019) reported in their study that the level of knowledge of pediatricians in oral care of children was not appropriate during the residency period (29, 30). Given the key role of pediatricians in addressing children's oral health, their education in this area should be increased at the residency and in clinics (31). One of the suggested ways to increase the level of knowledge of pediatricians in children's oral health is to include new courses in the curriculum of physicians, especially pediatrics (29). Accurate and early detection of dental caries in children can be very effective in its treatment (22). A high percentage of participants (90%) reported that inadequate brushing can be a risk factor for early tooth decay in children. According to the results of this review, nearly 100% of the participants (95%) reported that the consumption of sweet liquids can lead to tooth decay in children, which is consistent with the results of Giuseppe et al. (2006) (32). Excessive consumption of sweet foods and their persistence on the surface and between the teeth provides a good environment for the growth of bacteria, thus resulting in tooth decay (33). Previous studies have shown that 82% of pediatricians are highly confident in advising on some oral hygiene techniques for children,

such as informing their parents about the prohibition of consuming sweet juices, especially before bedtime (34).

A high percentage of pediatricians (78.7%) reported that their level of education in the field of children's oral health was insufficient. Consistent with this result, it was reported that about 80% of pediatricians were dissatisfied with the level of their education during the residency period and children's oral health (16, 23, 24, 34, 35, 36, 37, 38). Increasing the level of education of pediatricians about children's oral diseases is capable of elevating their self-confidence in their field performance (39).

The best time to do this is the residency course, when the student is eager to learn. Accordingly, the Association of American Medical Schools has issued a plan to increase pediatricians' education in relation to children's oral health (39). It has been reported that a number of universities worldwide have developed curricula to increase pediatricians' knowledge of children's oral health (40).

It has been reported that 86% of pediatricians obtained knowledge about children's oral diseases from scientific journals (32). In addition, 88.5% of the participants answered that the use of toothpaste containing fluoride was capable of preventing tooth decay. In contrast, several studies have found that almost half of pediatricians answered fluoride-related questions incorrectly (39, 41).

Since 2012, the U.S. Academy of Pediatrics has developed a program to increase pediatricians' education regarding oral diseases (36). Overall, a study by Di Giuseppe et al. (2006) reported that 56% of pediatricians are aware of all causes of dental caries (32). Participants' attitudes toward pediatric dental caries were positive, and 92.5% of pediatricians believed that tooth decay in children could be prevented. Based on the results of several previous studies, pediatricians have an effective role in promoting oral health of children and can prevent early tooth decay in children (16, 21, 32, 38, 42). Also, 59% of pediatricians believed that they could play an effective role in preventing oral caries in children. Nearly 100% of pediatricians believed that they can prevent early tooth decay in children, but do not have enough knowledge to screen this (16). Di Giuseppe et al. (2006) also reported that about 95% of pediatricians believe that they can prevent oral diseases in children (32). Also, 56% of pediatricians advised parents about baby bottle or feeding bottle use.

In contrast, a study by Kalkani et al. (2013) reported that about 95% of pediatricians advised parents about the association between bad eating habits and tooth decay (36). Baby bottle feeding should be stopped from the age of 12 months to prevent tooth decay (43). Moreover, 60.3% of the participants in this review study stated that they performed pediatric oral examinations to diagnose dental caries.

Consistent with this study, several studies have reported that approximately 70% of pediatricians performed oral examinations to check for caries (21, 23, 24). In previous studies, a high percentage of pediatricians (approximately 85%) performed pediatric dental examinations (42, 44, 45). In the United States, nearly 100% of pediatricians performed oral examinations of children, resulting in a timely diagnosis of approximately 50% of early tooth decay in children. If this is done at least

once a month (46). Nearly 70% and 50% of pediatricians, respectively, in two study conducted by Sezer et al. (2013) and Kalkani et al. (2013), believed that they were not able to accurately diagnose dental caries in children due to their insufficient knowledge (16, 23). In another study, although 82% of pediatricians agreed with the importance of pediatric dental examinations, but 48% were aware of the child's first visit to the dentist based on the child's age as recommended by the American Academy of Pediatrics. The results of this study showed that only 35.5% of pediatricians evaluated the amount of fluoride consumption, which is consistent with the results of Balaban et al. (23). It has also been reported that a high percentage of pediatricians did not recommend any fluoride supplementation (42). Kalkani et al. (2013) found that about 62% of pediatricians recommended fluoride toothpaste levels of 250 to 500 ppm for children 1 to 3 years old, which is lower than the WHO recommendation (1000 ppm), (36).

However, it seems necessary to detect the concentration of fluoride, especially in daily water consumption, due to its importance in tooth decay. In contrast, about 73% of pediatricians evaluated fluoride intake in children (45, 47). A high percentage of participants (73.3%) stated that they advised parents of children about brushing their teeth. These findings are consistent with the results of research by Bozogemehr et al. (2012) and Golubović et al. (2020) in which approximately 82% advised parents in this regard (21, 42).

According to the recommendation of the US Academy of Pediatrics, brushing with fluoride paste should be done twice a day (48). Glucose is converted into lactic acid by Lactic acid fermentation on teeth via bacteria activity, and thus causing tooth decay (49). Starting brushing at the time of child's teeth appearance can have a positive effect on their tooth health for the rest of their lives (49). However, about 25% of pediatricians agreed to start brushing with the appearance of teeth (37). According to this review, 58% of pediatricians reported that they referred children to dental care if necessary. In contrast, a high percentage of pediatricians (about 94%) referred children with dental caries to dental care centers (24). Indira et al. (2015) reported that although about 94% of pediatricians were aware of pediatric dentistry, only 48% referred children to the dentist (50). About 62% of pediatricians recommend that children should be referred to a dentist every six months from the age of one (16, 42, 51). In contrast, a study by Herndon et al. (2010) found that less than 20% of pediatricians advised parents to refer their children to dental care centers (39). Sezer et al. (2013) also reported that about 26% of pediatricians were able to diagnose tooth decay, where referred children to dental centers (16).

In addition, 40.7% of pediatricians reported that they provide health education to parents to prevent tooth decay. In a study by India et al., 88% of pediatricians advised parents about early tooth decay in children. Given the scientific evidence for the transmission of caries-producing oral bacteria in children (*Streptococcus mutans*), it is recommended that any maternal behavior such as sharing utensils should be avoided (19). In contrast, 76% of pediatricians provided adequate education to parents of children for preventing tooth decay (32).

## CONCLUSION

The results of this review showed that despite the positive attitude and belief of pediatricians regarding their responsibility in preventing tooth decay in children, they do not have enough self-confidence due to insufficient education in identifying and recognizing effective factors. Considering the role of pediatricians in children's oral health, it seems necessary to include courses and educational programs, especially in the residency.

## REFERENCES

1. Fisher-Owens SA, Gansky SA, Platt LJ, Weintraub JA, Soobader M-J, Bramlett MD, Newacheck PW. Influences on Children's Oral health: a conceptual model. *Pediatrics*. 2007; 120(3):e510.
2. Subramaniam P, Babu KLG, Bbu PS, Naiudu P. Oral health care of children: gynecologists and pediatricians' perspective. *J Clin Pediatr Dent*. 2008;32:253-258.
3. Petersen PE, Bourgeois D, Ogawa H, Estupinan-Day S, Ndiaye C. The global burden of oral diseases and risks to oral health. *Bull World Health Organ*. 2005;83(9):661-9.
4. US Dept. of Health and Human Services. Oral health in America: a report of the surgeon general. Rockville, MD: US Dept of Health and Human Services, National Institutes of Dental and Craniofacial Research, National Institutes of Health; 2000. Available: <https://www.nidcr.nih.gov/research/surgeon-general>.
5. Tabatabaian F, Saboury A, Ghane HK. The Prevalence of Temporomandibular Disorders in Patients Referred to the Prosthodontics Department of Shahid Beheshti Dental School in Fall 2010. *Journal of Dental School, Shahid Beheshti University of Medical Sciences*. 2013;31(1):52-9.
6. BVA da Silva, Freitas-Fernandes LB, Fidalgo TK, Martins C, Mattos CT, de Souza IP, Maia LC. Mother-to-child transmission of *Streptococcus mutans*: a systematic review and meta-analysis. *J Dent*. 2015;43:181-191.
7. US Dept of Health and Human Services, Public Health Service, National Institute of Health, National Institute of Dental and Craniofacial Research. National call to action to promote oral health. Rockville: National Institute of Dental and Craniofacial Research; 2003.
8. Sheiham A. Dental caries affects body weight, growth and quality of life in pre-school children. *Br Dent J*. 2006;201(10):625-6.
9. Soares IMV, Silva AMRB, Moura LFAD, Lima MDM, Nétto OBS, Moura MS, et al. Conduct of pediatricians in relation to the oral health of children. *Revista de Odontologia da UNESP*. 2013;42:266-72. Doi: [doi.org/10.1590/S1807-25772013000400006](https://doi.org/10.1590/S1807-25772013000400006).
10. American Academy of Pediatrics. Recommendations for preventive pediatric health care. *Pediatrics* 2000;105:645-6.
11. Yousef MY. Medical professionals' oral health knowledge, attitude and related practices performed for high caries – risk children. A thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy degree in oral science in the Graduate College of the University of Iowa, December, 2011. Available at: <http://www.ir.uiowa.edu/cgi/viewcontent.cgi?article=2692&context=etd>. Accessed: 26th April, 2015.
12. Jalalian E, Attar K, Samiee N, GOL MM, KASEB GH. Effect of timing for core preparation in the tooth fabricated with post and core casting on the tensile strength. 2018.
13. Elvey SN. The pediatricians' dental evaluation. *Pediatr Clin N Am*. 1982;29:761.
14. Caspary G, Krol DM, Boulter S, Keels MA, Romano-Clarke G. Perceptions of oral health training and attitudes toward performing oral health screenings among graduating pediatric residents. *Pediatrics*. 2008;122(2):e465-71.
15. Dickson-Swift V, Kenny A, Gussy M, McCarthy C Bracksley-O'Grady S. The knowledge and practice of pediatricians in children's oral health: a scoping review. 2020, *BMC Oral Health*. <https://doi.org/10.1186/s12903-020-01198-0>.
16. Sezer RG, Paketci C, Bozaykut A. Paediatricians' awareness of children's oral health: knowledge, training, attitudes and practices among Turkish paediatricians. *Paediatr Child Health*. 2013;18(4):e15-9.
17. Lewis CW, Grossman DC, Domoto PK, Deyo RA. The role of the pediatrician in the oral health of children: A national survey. *Pediatrics* 2000;106:E84.
18. Breastfeeding and tooth decay. Available from: <http://www.breastfeeding.asn.au/bfinfo/breastfeeding-and-tooth-decay>. Accessed: 16th June, 2015.
19. Nassif N, Noueiri B, Bacho R, Kassak K. Awareness of Lebanese pediatricians regarding Children's Oral health. *Int J Clin Pediatr Dent*. 2017;10(1):82-8.
20. Prakash P, Lawrence HP, Harvey BJ, McIsaac WJ, Limeback H, Leake JL. Early childhood caries and infant oral health: paediatricians' and family physicians' knowledge, practices and training. *Paediatr Child Health* 2006 Mar;11(3):151.
21. Golubović L, Selimović-Dragaš M, Kobašlija S, Huseinbegović A. The role of the pediatricians in dental caries prevention in Montenegro-the knowledge, attitude and practice. *Balkan J Dent Med*. 2020;24(1):29-37.
22. Bowen WH, Lawrence RA. Comparison of the cariogenicity of cola, honey, cow milk, human milk, and sucrose. *Pediatrics* 2005 Oct;116(4):921-926.
23. Balaban R, Aguiar CM, Da Silva Araujo AC, Dias Filho EBR. Knowledge of paediatricians regarding child oral health. *Int J Paediatr Dent*. 2012;22(4):286-91.
24. Tikare S, Eroje AB, Togoo RA, Marzoq SM, Alkhammah SM, Alshahrani MM, Alshahrani AA, Ravi K. Pediatrician's knowledge and practice of early childhood caries and infant oral health in southern Saudi Arabia. *J Dent Res Rev*. 2019;6(2):44.
25. Sandalli N, Kuvvetli SS, Cildir SK, Ergeneli S. The pediatricians' role in the oral health of children. *OHDMBS* 2007 Dec;VI(4):18-27.
26. de la Cruz GG, Rozier RG, Slade G. Dental screening and referral of young children by pediatric primary care providers. *Pediatrics* 2004;114:e642-52.
27. Jones K, Tomar SL. Estimated impact of competing policy recommendations for age of first dental visit. *Pediatrics* 2005;115:906-14.
28. Lewis CW, Boulter S, Keels MA, Krol DM, Mouradian WE, O'Connor KG, Quinonez RB. Oral health and pediatricians: results of a national survey. *Acad Pediatr* 2009 Nov;9(6): 457-461.
29. Fahimzad A, Nasiri Mohammad, Heydari H, Sadat Sarfjoo F. Study of Medical Interns' Knowledge Level About Children's Oral Health Between 2011 and 2012 in Medical Universities in Tehran, Iran. *Arch Pediatr Infect Dis*. 2015 July; 3(3): e21038.
30. Nasiri M, Salehi Sh, Negahi AR. Study of Pediatrician Knowledge Level about Children Oral/Dental Health during Residency Program between 2012 and 2014 in Medical Universities. *Prensa Med Argent* 2019, 105:3.
31. Haghighikhan M, Khaleghian M, Saberi Ali, Nasiri M. A Survey of Knowledge Level about Pediatric oral/dental Health among Pediatricians. *Indian Journal of Forensic Medicine & Toxicology*, January-March 2021, Vol. 15, No. 1.
32. Di Giuseppe G, Nobile CG, Marinelli A, Angelillo IF. Knowledge, attitude and practices of pediatricians regarding the prevention of oral diseases in Italy. *BMC Public Health*. 2006;6:176.

33. Tinanoff N, Palmer CA. Dietary determinants of dental caries and dietary recommendations for preschool children. *Refuat Hapeh Vehashinayim*. 2003; 20(2): 8–23, 78.
34. Caspary G, Krol DM, Boulter S, Keels MA, Romano-Clarke G. Perceptions of oral health training and attitudes toward performing oral health screenings among graduating pediatric residents. *Pediatrics*. 2008;122(2):e465–71.
35. Bottenberg PL, Van Melckebeke L, Louckx F, Vandenplas Y. Knowledge of Flemish paediatricians about children's oral health—results of a survey. *Acta Paediatr*. 2008;97(7):959–63.
36. Kalkani M, Ashley P. The role of paediatricians in oral health of preschool children in the United Kingdom: a national survey of paediatric postgraduate specialty trainees. *Eur Arch Paediatr Dent*. 2013; 14(5):319–24.
37. Eke CB, Akaji EA, Ukoha OM, Muoneke VU, Ikefuna AN, Onwuasigwe CN. Paediatricians' perception about oral healthcare of children in Nigeria. *BMC Oral Health*. 2015;15:164.
38. Dima S, Chang WJ, Chen JW, Teng NC. Early childhood caries-related knowledge, attitude, and practice: discordance between pediatricians and dentists toward medical office-based prevention in Taiwan. *Int J Environ Res Public Health*. 2018;15(6):1067.
39. Herndon JB, Tomar SL, Lossius MN, Catalanotto FA. Preventive oral health care in early childhood: Knowledge, confidence, and practices of pediatricians and family physicians in florida. *J Pediatr*. 2010;157(6):1018–1024.e1012.
40. Mouradian WE, Reeves A, Kim S, et al. An oral health curriculum for medical students at the University of Washington. *Acad Med* 2005;80:434–42.
41. Sandalli N, Kuvvetli SS, Cildir SK, Ergeneli S. The pediatricians' role in the oral health of children. *OHDMBSC* 2007 Dec;VI(4):18–27.
42. Bozorgmehr E, Mohammadi T, Hajizamani A, Vahidi A, Khajoei F. Knowledge, attitude, and practices of pediatricians about children's oral health. *J Oral Health Oral Epidemiol*. 2012;1(2):93–8.
43. Rayner J, Holt R, Blinkhorn F, Duncan K. British Society of Paediatric Dentistry: a policy document on oral health care in preschool children. *Int J Paed Dent*. 2003;13(4):279–85.
44. Brickhouse TH, Unkel JH, Kancitis I, Best AM, Davis RD. Infant Oral Health Care: a survey of general dentists, pediatric dentists, and pediatricians in Virginia. *Pediatr Dent* 2008; 30: 147–153.
45. Lewis CW, Boulter S, Keels MA, et al. Oral health and pediatricians: results of a national survey. *Acad Pediatr*. 2009;9(6):457–61.
46. Originating Committee Clinical Affairs Committee - Infant Oral Health Subcommittee. Guideline on Infant Oral Health Care [Online]. 2005; Available from: URL:[http://www.aapd.org/media/Policies\\_Guidelines/G\\_infantOralHealthCare.pdf](http://www.aapd.org/media/Policies_Guidelines/G_infantOralHealthCare.pdf)
47. Bhat SS, Sargod SS, Kumar K. Pediatricians' Views About oral Health Care. *Indian J Pediatr*, 2006;73:535–536.
48. American Academy on Pediatric Dentistry; American Academy of Pedodontics; American Academy of Pediatrics. Policy on early childhood caries (ECC): Classification, consequences, and preventive strategies. <[www.aapd.org/media/Policies\\_Guidelines/P\\_ECCClassifications.pdf](http://www.aapd.org/media/Policies_Guidelines/P_ECCClassifications.pdf)> (Accessed January 11, 2013).
49. Virdi M, Kaur M, Mittal S. Pediatricians' take on oral health of children. *The Internet Journal of Paediatrics and Neonatology* 2010; vol. 13 No. 1 Available at: <http://www.print.ispub.com/api/0/ispub-article/13627>. Accessed: 20<sup>th</sup> December, 2015.
50. Indira MD, Dhull KS, Nandal B. Knowledge, attitude and practice toward infant Oral healthcare among the pediatricians of Mysore: a questionnaire survey. *Int J Clin Pediatr Dent*. 2015;8(3):211–4.
51. American Academy of Pediatrics- Section on Pediatric Dentistry and Oral Health. Policy Statement. Preventive oral health intervention for pediatricians. *Pediatrics* 2008; 122: 1387–1394.