

# Dental decay and associated factors in Iranian three-year-old children

Mitra Ghazizadeh Ahsaie,<sup>a</sup> Marzieh Deghatipour,<sup>b</sup> Kazem Shahzadeh Fazeli,<sup>c</sup> Parvin Bastani,<sup>c</sup> Farnaz Ehdavand,<sup>c</sup> and Zahra Ghorbani<sup>b\*</sup>

<sup>a</sup>Dental student, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

<sup>b</sup>Department Community Oral Health, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

<sup>c</sup>Department Vice-chancellor for Health Affairs, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

\*Correspondence to: Ghorbani Z. (email: dryaszgh@yahoo.com).

(Submitted: 10 April 2017 – Revised version received: 30 May 2017 – Accepted: 10 June 2017 – Published online: Spring 2017)

**Objectives** The aim of this study was to assess dental caries and associated factors in children aged three years living in Varamin, Iran.

**Methods** Eight hundred and fifteen three-year-old children were recalled randomly through the records existing in healthcare centers of Varamin, Iran. Two hundred and three mothers were also examined to assess the relationship between the oral health of mothers and children. Dental examinations were performed by two calibrated senior dental students using decayed missed filled teeth (dmft/DMFT) indices according to the WHO oral health survey basic methods. Demographic and oral-health care behavior data were collected using a standard questionnaire.

**Results** The mean DMFT was  $2.69 \pm 3.492$  years (range 0–19 years). No significant difference was seen in dental care behavior of males and females; 43.4% of children were caries-free. A positive correlation was detected between mother's DMFT and child's dmft ( $r = 0.27$ ,  $P < 0.0001$ ). Adjusted regression analysis showed that dental caries was observed more frequently in children having mothers with DMFT > 12 compared to mothers with DMFT less than 6 (CR: 1.55; 95% CI: 1.02–2.35) after controlling for child's sex and behaviors.

**Conclusion** This study showed that more than half of the three-year-old children experience dental caries and there is a positive correlation between the DMFT of mothers and dmft of their children.

**Keywords** early childhood caries, oral health care behavior, dental decay

## Introduction

Oral health plays an important role in normal development of children as it is an important part of general health.<sup>1,2</sup> Over the past few decades, considerable improvement has been seen in preschool children's oral health in developed countries; on the contrary, a lack of good oral health support and care has been seen in developing countries, where malnutrition is still an issue, and early childhood caries (ECC) is still an important disease in young children.<sup>3</sup> As stated by the American dental association (ADA), ECC is defined as "the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries) or filled tooth surfaces in any primary tooth in a preschool-age child between birth and 71 months of age".<sup>4</sup> As a common public health problem, ECC is a multifactorial disease with various risk factors which can be categorized into three specific groups: biological, microbial, and behavioral.<sup>4,5</sup> ECC poses a significant public health problem in preschool children, and children having caries in their primary dentition are more likely to have caries in their permanent dentition.<sup>6</sup>

Parents, especially mothers have a significant impact on their children; also, maternal dietary habits and behaviors and maintenance of oral hygiene can strongly affect their children.<sup>7</sup> Maternal oral health knowledge and education, behaviors, beliefs and oral health status strongly predict the oral health status of their children.

Inappropriate nutrition is another risk factor for ECC. Having a diet full of sugar, frequent use of snacks and insufficient exposure to fluoride can increase the risk of caries formation.<sup>8,9</sup>

Poor socioeconomic status may also lead to higher rates of ECC. Childhood poverty, lack of dental visits of parents and their children and limited parental education may lead to

poor oral hygiene and eventually ECC.<sup>10</sup> According to the report of the Iran's National Oral Health Survey (NOHS), the prevalence of dental caries in the three-year-old Iranian children was 47% in 1999; the mean dmft was 1.8.<sup>11</sup> The prevalence was 52% in 2004 with a mean dmft of 1.9.<sup>11,12</sup> This relative increase in dmft suggests a need for better methods of oral health promotion in this age group. Unfortunately, the information regarding this age group was not collected in the recent NOHS conducted in 2011.<sup>13</sup>

The aim of this study was to evaluate the prevalence of dental caries and associated factors in three-year-old children residing in Varamin, a partially deprived city in the southern part of Tehran Province, Iran. Another objective of this study was to assess the correlation between dental caries and dental care behavior of mothers and their children. Such information may help ameliorate intervention planning to improve oral health in this age group.

## Methods

This study was approved in the Committee of Ethics in Research Affairs of Dental School, Shahid Beheshti University of Medical sciences (IR.SBMU.RIDS.REC.1394.12.3). The mothers or legal guardians of children were informed about the study objectives and an informed consent was obtained from them for participation.

This community-based cross-sectional study was performed to provide baseline data for a community oral health promoting intervention to be implemented in "Pishva" and "Pakdasht" regions, located in Varamin, a southern part of Tehran Province in Iran. Data collection started in July 2015, and lasted for three months.

### Sample Size and Subject Recruitment

According to a previous survey on the Iranian population,<sup>11,12</sup> the mean (SD) dmft of three-year-old Iranian children was equal to 1.9 (2.8), 94% of which was related to caries component. Considering 95% confidence interval with accepted power of 0.8, and 25% estimated reduction in decayed teeth after a three-year intervention, a sample of approximately 495 subjects in each region was needed for the study.

Three-year-old children were recalled randomly from the list of children who had received the 18-month vaccination program (with more than 95% population coverage). Recruitment was done using records from all 16 healthcare centers in Pishva and Pakdasht, randomly and proportionally according to the population covered by the healthcare center. The target population comprised of children aged 3 years. Children with major systemic diseases or on long-term medication, and those who were not cooperative and refused examination were excluded. To gather information regarding mothers' oral health, one out of three mothers received oral examination and completed mothers' questionnaire. To select the first mother, a random number was selected from one to three, and then other mothers were selected adding three to the last number.

### Study Design

Two dentists were trained according to the World Health Organization (WHO) oral health survey basic methods,<sup>12</sup> and calibrated clinically using 10 patients in a two-day calibration workshop. The intra- and inter-examiner reliability of measuring dental caries were investigated for both of the examiners. In case of examination of both mother and child, mother was examined by a different examiner to ensure blindness about her child's oral health status.

The questionnaire collected information about the child's demographic characteristics, perceived oral health, dental pain, frequency of dental visit, frequency of tooth brushing, frequency of dental flossing, eating sweets between the main meals, and parental level of education (Fig. 1).

The number of decayed, missing and filling teeth was recorded by examination under natural light using a dental mirror, and round- tip periodontal probe according to the recommendations of the WHO. Then, selected mothers responded to the adult questionnaire in a face to face interview. Adult questionnaire included the same questions as the children's questionnaire, with an added question about smoking. Also, mothers' DMFT was assessed through oral examination. For further analysis, mother's DMFT was categorized into three equal groups based on a data-driven approach (<6, 7–11, >12). To motivate people for participation, all children were given a tube of child's toothpaste and a tooth brush. Brushing method was demonstrated to all mothers and brushing twice daily was advised as well.

### Statistical Analysis

All data were entered into a data entry form and statistical analysis was performed using SPSS version 21 (SPSS Inc., IL, USA). For all statistical tests, a confidence interval of 95% and significance level of 5% ( $P < 0.05$ ) were considered. The Pearson correlation test was applied to assess the relationship between mother's DMFT and her child's dmft. The relationship between the children's oral health care behavior and their dmft was assessed using the Mann-Whitney test and an

#### 1. How do you find your child oral health?

Positive (Excellent, very good or good)  
Negative (moderate, poor or very poor)

#### 2. Has your child experienced any dental pain within recent 12 months?

Yes (usually, often, occasionally)  
No (never)

#### 3. Have you had any dental visits in the previous 12 months?

Yes ("once" to "more than four times")  
No ("no dental visit within 12 months", "never visited a dentist")

#### 4. How often do you usually brush/floss your child teeth?

Once or more than once a day  
Less than once a day

#### 5. How often does your child eat sweet items between the main meals?

Once  
More than once a day

#### 6. Parents' education

Lower than diploma  
Diploma and upper than diploma

Fig 1. Questionnaire.

independent samples *t*-test. As the outcome (child's d) was a count variable with over-dispersion [mean = 2.69, standard deviation (SD) = 3.49], negative binominal regression was applied to study the association between mothers' DMFT and child's dental caries. However, as a result of excess zeros (43.4% of children without caries), zero-inflated negative binominal regression model was also tested, but it was not taken into consideration due to the complexity of interpretation, and the negligible improvement in modelling (Vuong test > 0.05). An unadjusted and two adjusted models were run by adding gender, and dental care behavior to the unadjusted model, keeping the variables with *P*-values less than 0.25.

### Results

From 911 three-year-old children invited to participate in this study, 96 did not show up and 12 were not cooperative in the examinations. Of the remaining 815 three-year-old children, 398 (48.4%) were boys and 417 (51.2%) were girls. Table 1 displays the main characteristics of the studied sample.

The mean dmft in all children was 2.69 (SD = 3.492, range 0–19), 43.4% of children were caries-free. The mean dmft in girls was 2.54 (SD = 3.39), which was significantly more than the mean dmft in boys (2.86, SD = 3.59;  $P < 0.05$ ). As more than 90% of dmft was related to the decayed teeth, the variable "d" was further analyzed in this study. The mean "d" was 2.78 (SD = 3.54) in boys and 2.49 (SD = 3.4) in girls. Also, no significant difference was seen between boys and girls in this variable ( $P = 0.4$ ); 43.5% of boys and 43.4% of girls were caries-free and Chi-square test showed no significant difference between males and females ( $P = 0.52$ ).

Table 1. **Distribution of demographic, behavioral and oral health indices in 3-year-old children (n = 815)**

Variables		N (%)	d (Mean, SD)	Having dental pain (%)	Poor perceived oral health (%)	Caries free (%)	Treatment need (%)		
Sex	Male	398(48.4)	2.78( 3.54)	4.8	90	43.5	18.8		
	Female	417(51.2)	2.49(3.4)	3.1	89.6	43.4	16.1		
	Missing data	0							
P-value			0.47	0.22	0.86	0.98	0.29		
Back-ground	High school diploma and upper	694(85.2)	2.63(3.44)	3.8	89.2	43.2	16.7		
	Mother's educational level								
	Lower than high school diploma	118(14.5)	2.67(3.58)	5.2	93.8	44.1	22		
	Missing data	97(11.9)							
P-value			0.85	0.47	0.17	0.86	0.16		
Father's educational level	High school diploma and upper	688(84.4)	2.56(3.40)	3.5	88.7	44.8	17.2		
	Lower than high school diploma	125(15.3)	3.05(3.73)	6.6	96.2	36	19.2		
	Missing data	2(0.2)							
	P-value			0.71	0.11	0.01	0.06	0.57	
Behaviors	Once or more than once a day	610(74.8)	2.64(3.45)	3.1	90.3	43.1	18.5		
	Brushing	Less than once a day	195(23.9)	2.64(3.52)	6.7	87.7	44.1	17.2	
		Missing data	10(1.2)						
		P-value			0.97	0.02	0.34	0.87	0.69
	Once or more than once a day	49(6.0)	2.70(3.50)	2.2	95.6	53.1	10.2		
	Flossing	Less than once a day	764(93.7)	1.51(2.35)	3.9	89.6	42.9	17.8	
		Missing data	2						
		P-value			0.03	0.54	0.19	0.16	0.17
		Once or twice	585(71.8)	2.43(3.50)	2.7	89.7	45	16.1	
	Consumption of sweets	More than twice a day	228(28)	3.34(3.69)	7.1	90	39.5	21.1	
Missing		2							
P-value			0.03	0.005	0.89	0.18	0.09		
Dental visit in the past year	Yes No	138(16.9)	4.09(4.25)	13.5	96.6	23.9	23.2		
	Missing	667(81.8)	5.80(4.57)	1.8	89.1	47.7	16.3		
P-value			10(1.2)	0.05	0.00	0.00	0.05		
All		814	2.63(3.45)	4	89.8	43.4	17.4		

No significant difference was seen in dental care behaviors such as frequency of eating sweets, brushing, flossing and dental visit between the two genders.

Table 1 shows that children with lower frequency of brushing and higher frequency of sweet consumption experienced significantly higher dental pain and dental caries ( $P < 0.05$ ). Also, children having no dental visit in the past 12 months showed significantly higher dental caries, experienced significantly less dental pain and required less dental treatments ( $P < 0.05$ ).

A positive correlation was detected between mother's DMFT and child's dmft ( $r = 0.27, P < 0.001$ ). According to Table 2, dental caries was significantly more common in children whose mothers' DMFT was more than 12 compared to mothers with DMFT less than 6 ( $P < 0.05$ ).

According to Table-3, adjusted regression analysis showed that dental caries was observed more frequently

in children having mothers with DMFT more than 12 compared to mothers with DMFT less than 6 (CR: 1.55; 95% CI: 1.02–2.35) after controlling for child's sex and behavior.

## Discussion

The purpose of this study was to assess dental caries experience and associated factors in children aged 3 years living in Varamin; also the association between mothers' and children's dental caries and dental care behavior was assessed.

The mean dmft of all children was 2.69. No significant difference in dental caries was detected between males and females, which was consistent with the results of other studies carried out in Tehran, Iran.<sup>11,12</sup> Also, 43.3% of children were caries-free. The results of this study indicated that the mean

Table 2. **Mother's characteristics and dental caries of their children (n = 203)**

Mother's characteristics			N (%)	Child's d (Mean, SD)
<b>Demographics</b>	Age (yrs.)	20–30	121(59.6)	2.34(3.20)
		30–40	78(38.4)	2.64(3.38)
		>40	4(2)	0.75(1.50)
	P-value			0.17
<b>Behaviors</b>	Brushing	Once or less than once a day	44(22.2)	2.73(4.22)
		More than once	146(73.7)	2.26(2.86)
		Missing data	5	
		P-value		
	Flossing	Once or less than once a day	165(85.9)	2.49(3.43)
		More than once	27(14.1)	2.11(2.25)
		Missing data	11	
		P-value		
	Sweet consumption	Once	122(74.8)	2.47(3.36)
		More than once	41(25.2)	2.80(3.57)
		Missing data	40	
		P-value		
	Dental visit	Yes	117(57.9)	2.77(3.42)
		No	85(42.1)	1.93(2.97)
		Missing data	1	
		P-value		
Smoking	Yes	6(3)	4.17(4.44)	
	No	195(96.1)	2.39(3.22)	
	Missing data	0		
	P-value			0.45
<b>Dental caries</b>	DMFT	≤6	69(34)	<b>2.12 (3.14)</b>
		7–11	71(35)	<b>1.87 (2.40)</b>
		≥12	63(31)	<b>3.38 (3.97)</b>
		Missing data	0	
	P-value			<b>0.017</b>

Table 3. **Correlation of mother's dental caries and child's dental caries**

		Model 1		Model 2		Model 3	
		CR	95% CI	CR	95% CI	CR	95% CI
Mother's DMFT	≤6	1		1		1	
	7–11	0.85	0.57–1.29	0.85	0.56–1.28	0.89	0.59–1.37
	≥12	1.55	1.03–2.32	1.56	1.037–2.35	1.55	1.02–2.35
Child's sex	Male			1		1	
	Female			0.85	0.611–1.20	1.10	0.06–21.22
Child's dental visits in the past year	Yes					1	
	No					0.47	0.30–0.72

CR, Count ratio; CI, Confidence Interval; Bold, Significant Association; P-value < 0.05. \*The frequency of brushing, flossing and sweet consumption was removed from model 3 because of P-value > 0.25.

dmft of three-year-old children was higher than the previous study carried out in 1999 on a national sample of 750 Iranian three-year-old children with a mean dmft of 1.8.<sup>11</sup> It should be mentioned that the present study was carried out in Varamin

region which is almost a deprived region and may reflect a worse oral health status as well. As more than 90% of dmft belonged to the decayed teeth, it could be presumed that the oral health status of this age group was not satisfactory, which

may be due to poor education of their parents regarding oral health. A study by Mohebbi et al. showed that the prevalence of ECC was 33% for the 26- to 36-month-olds.<sup>12</sup> In a study by Toutouni et al., the frequency percentage of caries-free children was 10.87%, non-cavitated enamel caries (codes 01–02) had 28.03% prevalence, and about 61.1% had cavitated caries (codes 03–06).<sup>11</sup> Warren et al., conducted a study and indicated that over 80% of children had dental caries by the time of their third birthday, and caries risk factors included drinking sugary beverages, greater household size, and maternal factors (nutritional and eating habits).<sup>4</sup>

Mother's DMFT was significantly associated with child's dental caries, and children's oral health care behaviors could not attenuate this association. This implicates that mother's dental experience could affect dental caries in their three-year-old child. In other words, children of mothers with more dental caries, experienced more dental decay even if they had better oral health care behaviors. This could be justified by the transmission of cariogenic bacteria from the mother's mouth to the child's.<sup>13</sup>

This study benefitted from a relatively large sample size of three-year-old children and is one of a few epidemiological studies conducted in the past decade in this age group in Iran. Another advantage of this study was the accuracy of the results because of the careful calibration process of the examiners according to the WHO guide. The results of this study could be generalized to three-year-old children residing in Varamin, as the samples were randomly selected from all the health centers in the region. However, there were some limitations as well. First, some recalled parents did not show up in the health centers for participation and some attended children were not cooperative during dental examinations, which all could affect the results of this study. Second, there may be some other factors influencing dental caries in children, which were not included in this study such as socioeconomic status of the family, feeding practices from birth to three years of age, and level of fluoride use.

We found a significant relationship between dental visit and dental caries. Children with higher frequency of dental visits in the past 12 months experienced significantly more dental pain, more caries and needed treatment. In this study, we assessed the utilization of dental facilities among three-year-old children and the frequency of dental visit, which was only 16.9%. This low percentage of dental visit in this age group may be due to the lack of cooperation, their dependence on their parents for each visit and mothers' lack of knowledge on the importance of dental visit for their children. In another study, the influence of accessibility of dental services on the development of ECC was assessed. The result of this study suggested higher prevalence of ECC among children without a family dentist. They also showed that lower parental knowledge about their child's eating habits was associated with higher likelihood of ECC.<sup>8</sup>

Another finding of this study was that there was a positive correlation between mother's DMFT and child's dmft. No other similar study assessing the relationship of mothers' clinical indices and children's dental caries has been performed on the Iranian population. The findings of another study also showed that caries prevalence was significantly higher in children whose mothers had decayed teeth;<sup>15</sup> however, this study assessed children in a wide age range (12 to 36 months) and examined only 77 mother-child pairs; therefore, the statistical precision could

not be justified. Various studies have shown that mothers' normal oral flora and bacterial properties (mutans streptococci and lactobacilli) of their saliva could strongly affect their children's oral bacterial load.<sup>13,15</sup> Also, mothers are dominantly in charge of their children's dietary intake and cleaning of teeth, and this could significantly affect their oral health.

In our study children consuming more sweets between their main meals experienced significantly more dental caries and therefore more pain. In the study of Evans et al., children with the highest consumption of sugar sweetened beverages were 2.0 to 4.6 times more likely to develop severe ECC as compared to those with the lowest consumption of such drinks.<sup>1</sup> Also, it has been suggested that snacking habits are correlated with ECC.<sup>9</sup>

This study could not find any relationship between parental level of education and children's dental caries. Unfortunately, it seems that there is lack of sufficient oral health care education in the Iranian educational system. A previous study showed lack of sufficient oral health behavior education in primary school textbooks.<sup>16</sup>

In 2015, Weatherwax et al. conducted a study to identify the possible relationship between parents' sociodemographics, intention and knowledge with oral health status of their child. Their results suggested that parent ethnicity and years of education were significantly related to dmft of their child ( $P < 0.05$ ) and higher level of education was significantly associated with lower dmft ( $P < 0.05$ ).<sup>17</sup>

This study indicated that the oral health care status of three-year-old children was not satisfactory with more than half of the three-year-old children experiencing caries. Proper interventional methods are required to improve this situation; also, improvement in mother's education, knowledge and attitude toward oral health care behaviors can also help. This interventional method should mainly target mothers having preschool children or even mothers being pregnant at the time. According to a study by Azedevo et al., educational intervention targeting mothers of one-year olds, may reduce dental caries.<sup>7</sup> Although in another study, the results showed that there was some evidence that using a motivational interviewing approach when delivering oral health information (fluoride use, tooth brushing, dietary practice and dental attendance) had a positive effect on parents/caregivers' oral health knowledge, attitude and behavior compared to traditional dental health education.<sup>18</sup> Jiang et al., also suggested that the effectiveness of oral health education and hands-on training for parental tooth brushing may not be different from that of oral health education alone for preventing dental caries in young children with low risk of dental caries.<sup>19</sup> Further studies are required to assess interventional procedures to reduce the prevalence of ECC in preschool children living in Iran.

## Conclusion

More than half of three-year-old children living in Varamin had dental caries, which required treatment. Also, dental caries in children was correlated with mothers' DMFT.

## Conflict of Interest

None. ■

## References

1. Evans EW, Hayes C, Palmer CA, Bermudez OI, Cohen SA, Must A. Dietary intake and severe early childhood caries in low-income, young children. *J Acad Nutr Diet.* 2013;113:1057–1061.
2. Jain M, Namdev R, Bodh M, Dutta S, Singhal P, Kumar A. Social and behavioral determinants for early childhood caries among preschool children in India. *J Dent Res Dent Clin Dent Prospects.* 2015;9:115–120.
3. Bagherian A, Sadeghi M. Association between dental caries and age-specific body mass index in preschool children of an Iranian population. *Indian J Dent Res.* 2013;24:66–70.
4. Warren J, Blanchette D, Dawson D, Marshall T, Phipps K, Starr D, et al. Factors associated with dental caries in a group of American Indian children at age 36 months. *Community Dent Oral Epidemiol.* 2016;44:154–161.
5. Tiwari T, Albino J, Batliner TS. Challenges faced in engaging American Indian mothers in an early childhood caries preventive Trial. *Int J Dent.* 2015;2015:179189.
6. Stephen A, Krishnan R, Ramesh M, Kumar VS. Prevalence of early childhood caries and its risk factors in 18–72 month old children in Salem, Tamil Nadu. *J Int Soc Prev Community Dent.* 2015;5:95–102.
7. Azevedo M, Romano A, Correa M, Santos IS, Cenci M. Evaluation of a feasible educational intervention in preventing early childhood caries. *Braz Oral Res.* 2015;29:1–8.
8. Werneck R, Lawrence H, Kulkarni G, Locker D. Early childhood caries and access to dental care among children of Portuguese-speaking immigrants in the city of Toronto. *J Can Dent Assoc.* 2008;74:805.
9. Nakayama Y, Mori M. Association between nocturnal breastfeeding and snacking habits and the risk of early childhood caries in 18-to 23-month-old Japanese children. *J Epidemiol.* 2015;25:142–147.
10. dos Santos Junior VE, de Sousa RMB, Oliveira MC, de Caldas Junior AF, Rosenblatt A. Early childhood caries and its relationship with perinatal, socioeconomic and nutritional risks: a cross-sectional study. *BMC Oral Health.* 2014;14:47.
11. Toutouni H, Nokhostin MR, Amaechi BT, Zafarmand AH. The prevalence of early childhood caries among 24 to 36 months old children of Iran: using the novel ICDAS- II method. *J Dent (Shiraz).* 2015;16:362–370.
12. Mohebbi S, Virtanen J, Vahid-Golpayegani M, Vehkalahti M. Early childhood caries and dental plaque among 1–3-year-olds in Tehran, Iran. *J Indian Soc Pedod Prev Dent.* 2006;24:177.
13. Chaffee B, Feldens C, Vítolo M. Cluster-randomized trial of infant nutrition training for caries prevention. *J Dent Res.* 2013;92:S29–S36.
14. de Souza PM, Mello Proença MA, Franco MM, Rodrigues VP, Costa JF, Costa EL. Association between early childhood caries and maternal caries status: a cross-section study in São Luís, Maranhão, Brazil. *Eur J Dent.* 2015;9:122–126.
15. Jayaraj D, Ganesan S. Salivary pH and buffering capacity as risk markers for early childhood caries: a clinical study. *Int J Clin Pediatr Dent.* 2015;8:167–171.
16. Kazemian R, Ghasemi H, Movahhed T, Kazemian A. Health education in primary school textbooks in Iran in school year 2010–2011. *J Dent (Tehran).* 2014;11:536–544.
17. Weatherwax J, Bray K, Williams K, Gadbury-Amyot C. Exploration of the relationship between parent/guardian sociodemographics, intention, and knowledge and the oral health status of their children/wards enrolled in a Central Florida Head Start Program. *Int J Dent Hyg.* 2015;13:49–55.
18. Naidu R, Nunn J, Irwin JD. The effect of motivational interviewing on oral healthcare knowledge, attitudes and behaviour of parents and caregivers of preschool children: an exploratory cluster randomised controlled study. *BMC Oral Health.* 2015;5:101.
19. Jiang E, Lo E, Chu C, Wong M. Prevention of early childhood caries (ECC) through parental toothbrushing training and fluoride varnish application: a 24-month randomized controlled trial. *J Dent.* 2014;42:1543–1550.

### How to cite:

Ghazizadeh Ahsaie M, Deghatipour M, Shahzadeh Fazeli K, Bastani P, Ehdavand F, and Ghorbani Z. Dental Decay and Associated Factors in Iranian Three-Year-Old Children. *J Dent Sch.* 2017;35(2):48–53.