

Original Article

Toothbrushing frequency among 4–6-year-old Iranian children and associated maternal attitude and sociobehavioral factors

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ABSTRACT

Background: Toothbrushing is an important aspect of children's oral health self-care. This study aimed to explore toothbrushing frequency among 4–6-year-old Iranian children and associated maternal attitude and sociobehavioral factors.

Materials and Methods: This cross-sectional study was conducted on 407 mother–child (aged 4–6 years) pairs through stratified random sampling in Tabriz, Iran. Data were collected using self-reported questionnaires including demographic characteristic, maternal attitude, and toothbrushing frequency of both mothers and children. Logistic regression was used to determine the predictors of children's toothbrushing. Statistical significance was set at $P < 0.05$ for all tests.

Results: The mean ages were 32.6 ± 4.8 and 5.3 ± 1.1 years for mothers and children respectively. Twice-daily toothbrushing was observed at a relative frequency of 12.8% in children and 18.4% in mothers. About 43.7% of children brushed their teeth once daily. Nearly 38.7% of children started toothbrushing behavior regularly at 4 years of age, and 41% had dental visits. Multiple logistic regression analysis indicated that children's toothbrushing (once daily or more) was associated with maternal brushing frequency (odds ratio [OR] = 2.0, 95% confidence interval [CI] = 1.53–2.86), maternal attitude toward oral health (OR = 1.15, CI = 1.08–1.22), and children's age (OR = 1.21, 95% CI = 1.02–1.77).

Conclusion: The descriptive results indicated that maternal and children toothbrushing behaviors are unfavorable. Furthermore, maternal toothbrushing behavior is a strong predictor of children's brushing behavior. Health promotional activities seem necessary for mothers to enhance oral health behavior of their children.

Key Words: Attitude, child, oral health, toothbrushing

Received: December 2015
Accepted: November 2016

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INTRODUCTION

Nowadays, dental caries is one of the most common chronic diseases among children.^[1] According to the WHO, at least one in four of 5–6-year-old children

suffer from tooth decay.^[2] Iran's National Oral Health Survey reported that 89% of 6-year-old children had

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How to cite this article: Soltani R, Eslami AA, Akhlaghi N, Sharifirad G, Alipoor M, Mahaki B. Toothbrushing frequency among 4–6-year-old Iranian children and associated maternal attitude and sociobehavioral factors. Dent Res J 2017;14:50-6.

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dental caries experience, and decayed, missing, and filled teeth (dmft) score was 5 for 6-year-old and 1.9 for 3-year-old children.^[3]

Early childhood caries (ECC) influences oral health, well-being of young children, and their quality of life.^[4] In addition, it can be associated with processes of socialization, communication, and self-esteem.^[5] However, ECC is generally preventable^[6,7] and is related to lifestyle,^[8] oral health behaviors, feeding habit, and access dental care to a large extent.^[9,10]

Promoting toothbrushing and use of fluoride are two main approaches to prevent dental caries in children.^[11] "Toothbrushing is the most effective method of oral hygiene, and the universally recommended frequency has been twice a day."^[12] Furthermore, toothbrushing twice daily is a part of recommended children's oral health self-care.^[13,14] Parents' duty to their children's oral health and toothbrushing habits is more important,^[15,16] and brushing habits were mainly established by mothers (84%).^[17] In a study by Bennadi *et al.*, it was revealed that mother's attitude regarding oral health, knowledge, and practices had been associated with Indian children's dental caries prevalence.^[18]

Despite recommendation of tooth brushing twice-daily, it has been reported that it was less than recommended frequency from 5% (12–36-month-old children) to 46% (9-year-old children).^[17,19] A few studies have been performed regarding the patterns of toothbrushing and modifying factors of this behavior.^[11–18] Preschool children are only partially capable of toothbrushing, so parents should supervise them during brushing.^[20] To the best of our knowledge, this study is one of the few studies that have investigated toothbrushing frequency and influence of mothers' sociobehavioral factors in 4–6-year-old children in Iran.

Understanding the importance of this issue can be beneficial to design more effective interventions to promote oral health programs. The aims of the present study were as follows: (1) to determine the toothbrushing behavior in Iranian preschool children; (2) to determine the relationship between maternal sociobehavioral factors and toothbrushing frequency among 4–6-year-old children.

MATERIALS AND METHODS

Participants and study design

This cross-sectional study was conducted on 407 mothers of children aged 4–6 years referred to

the health centers of the Tabriz University of Medical Sciences from August 2014 to November 2014, Tabriz, Iran.

Stratified sampling was used for sample selection. From a list of all 40 health centers^[20] in Tabriz, 15 centers were randomly selected. Then, according to the proportion of clients in each health center, children aged 4–6 years were randomly selected (15–35 children per center).

The sample size was determined as 421 participants based on 48% prevalence of toothbrushing once a day,^[17] level of confidence ($z\alpha/2 = 1.96$), 5% level of precision, and 10% nonresponse rate. The inclusion criteria included children's age between 4 and 6 years, maternal willing to participate in this survey, and not suffering from obvious physical, mental, and emotional diseases. After obtaining informed consent, children and their mothers voluntarily participated in the study.

Questionnaire

Data were collected through the self-administered questionnaires which were completed by the mothers of 4–6-year-old children.

The questionnaire included sociodemographic variables, maternal attitude toward oral, and toothbrushing frequency of both mothers and children.

Sociodemographic characteristics included maternal and child age (in year), maternal employment status and educational level (illiterate, primary school, secondary school, high school, diploma, and academic education), child's gender, and the number of children in household.

The frequency of child toothbrushing was measured through a statement asking from mothers, "How often do you usually brush your child's teeth or your child brushes his/her own teeth?" using the 5-point scale (1 = never, 2 = rarely, 3 = a few times a week, 4 = once daily, and 5 = twice daily or more). Reasons were categorized in two levels:^[21] once a day or more (once daily and twice daily or more) and less than once a day (never, rarely, and a few times a week) for use in logistic analyses.

The maternal attitude was measured using six statements describing mothers' opinion about children oral health adapted in the previous study, in which the reliability was reported (0.86).^[22] The responses of each attitude statement were ranged from "strongly agree" to "strongly disagree" in a 5-point Likert scale.

The possible score range was 6–30, and a higher score indicated a higher attitude. The examples of attitude items are as follows: “it is important to do routine dental examination for children,” “oral health problems can lead to general health problems in children,” and “toothbrushing is an important aspect of child' oral health care.”

The content validity of the questionnaire was confirmed by the expert panel of ten academicians (dental public health, health education, and health workers). The mean content validity ratio (CVR) was calculated as 0.85. For calculating the CVR, the experts rated each item of the questionnaire on a 3-point rating scale (1 = it is essential, 2 = it is useful but not essential, and 3 = it is not essential). The CVR for each item was calculated using the formula, $CVR = (N_e - [N/2]) / (N/2)$ where N_e is the number of experts indicating “essential” for each item of the questionnaire and N is the total number of experts. The numeric value of CVR is determined by Lawshe table, and the CVR value of 0.62 or above is acceptable. The reliability of the questionnaire was assessed by test–retest (2-week interval) among 30 eligible mothers in a health center, and the obtained data were not included in the final analysis. The test–retest reliability coefficient was 0.81.

Statistical analysis

Descriptive statistics were performed to explore the data (means and standard deviation [SD] for quantitative variables and frequencies for categorical variables). Simple and multiple logistic regression models (results were reported as odds ratio [OR] with 95% confidence interval [CI]) were performed to assess the association between dependent and independent variables. SPSS version 20 (SPSS, Inc., Chicago, IL, USA) statistical software was used to analyze the data. The P value of <0.05 was taken as statistically significant.

Ethical issues

After approval of the Ethics Committee of Isfahan University of Medical Sciences, Iran (Project Number 393296), written consent was obtained from participating mothers who volunteered to enter the study. The purpose of the study was explained, and the questionnaires were completed anonymously.

RESULTS

A total number of 407 pairs of mothers and children aged 4–6 years participated in this study. The participation rate was 95.2.

The mean age of mothers was 32.6 years (range: 20–48 years, $SD = 4.8$) and of children 5.3 years (range: 4–6, $SD = 1.1$). According to the results, 23.2% ($n = 95$) of mothers were in higher educational level and 1.7% ($n = 7$) were illiterate. The majority (89.7%) of mothers were unemployed [Table 1].

Based on the results as shown in Table 1, the prevalence for brushing frequency twice a day was 18.4% ($n = 75$) and 12.8% ($n = 52$) for mothers and children, respectively. The majority (43.7%) of children brushed their teeth once a day (95% CI = 38.9%–48.5%). In addition, brushing frequency rarely or never was reported 7.3% ($n = 30$) for mothers and 24.3% ($n = 99$) for children.

The mean of maternal attitude score toward oral health was 23.8 (range: 6–30; $SD = 4.5$). The most of children (38.7%) started toothbrushing behavior from 4 years.

Table 1: Socio-demographic and clinical characteristics for mothers and children

Variables	<i>n</i> (%)
Child's gender	
Boy	217 (53.3)
Girl	190 (46.7)
Maternal education	
Illiterate	7 (1.7)
Primary	29 (7.1)
Middle school	60 (14.7)
High school	34 (8.4)
Diploma	182 (44.7)
College or University	95 (23.3)
Children dental visit	
Yes	167 (41)
No	240 (59)
Number of children	
one	154 (37.8)
Two	219 (53.8)
Three or more	34 (8.4)
Maternal employment	
Employed	42 (10.3)
Unemployed	365 (89.7)
Economic status	
Very weak	30 (7.4)
Weak	82 (20.1)
Average	220 (54.1)
Good	60 (14.7)
Very good	15 (3.7)
Reasons for child's dental visit	
Check-up	25 (14.9)
Pain treatment	142 (85.1)
Experience of dental pain during 6 months ago	123 (30.2)

The simple logistic regression analysis indicated that children frequency of toothbrushing had a significant relationship with maternal frequency of toothbrushing, educational level, and attitude toward oral health [Table 2]. Furthermore, there was a significant difference between child toothbrushing and his/her age. There was no statistically significant difference between toothbrushing frequency and child's gender [Table 3].

Based on the results as shown in Table 4, the multiple logistic regression analysis indicated that maternal toothbrushing frequency (OR = 2.0, 95% CI = 1.53–2.86), attitude toward oral health (OR = 1.15, 95% CI = 1.08–1.22), and child's age (OR = 1.21, 95% CI = 1.0–1.77) were

Table 2: Tooth brushing frequency for maternal and children of the study sample

Variables	Children (n=407), n (%)	Mothers (n=407), n (%)
Brushing frequency		
Never	51 (12.5)	12 (2.9)
Rarely	48 (11.8)	18 (4.4)
time a week	78 (19.2)	55 (13.6)
Once a day	17 (43.7)	247 (60.7)
twice a day	52 (12.8)	75 (18.4)
Age (years)		
Mean±SD (minimum-maximum)	5.3±1.1 (4-6)	32.6±4.8 (20-48)

SD: Standard deviation

the significant predicting factors for children's toothbrushing once a day or more.

DISCUSSION

According to the results of this study, children's brushing frequency twice a day was 12.8% and once a day 43.7%. In Asgari *et al.*'s study, it was found that "twice a day" brushing frequency was 14.3% among individuals aged between 6 and 70 years.^[23] In another study performed in Iran, mothers reported twice-daily oral cleaning by 5% of children aged 12–36 months.^[13] Furthermore, in a cross-sectional study in India, it was 16.3%.^[17] This finding contrasts with of some other studies in this filed. The results of some other studies about children's toothbrushing behavior are more desirable than that of the present study; for instance, in Chu *et al.*'s study 75% of preschool children^[24] and in Wigen and Wang longitudinal study 61% of 3-year-old and 79% of 5-year-old children were reported twice-daily toothbrushing, respectively.^[11] Twice-daily brushing in Poland and Australia was reported by 18% and 61%, respectively.^[25,26]

This low toothbrushing frequency can be related to the health determiners such as socioeconomic, sociodemographic,^[22] and primary health-care delivery system. Hence, appropriate program to promote oral

Table 3: Simple logistic regression analysis for children's brushing (once a day or more vs. less than once a day)

Variables	Children's toothbrushing frequency, n (%)		Crude OR 95% CI	P
	Once a day or more	Less than once a day		
Maternal education				
Under diploma	42 (43.8)	54 (56.2)	1*	
Diploma/university	188 (60.5)	123 (39.5)	0.509 (0.32-0.8)	0.004
Child's gender				
Boys	127 (58.5)	90 (41.5)	1*	
Girls	103 (54.2)	87 (45.8)	1.14 (0.76-1.6)	0.51
Maternal employment				
Unemployed	199 (54.5)	166 (45.5)	1*	
Employed	25 (59.5)	17 (40.5)	1.2 (0.58-2.3)	0.56
Economic status				
Very weak	9 (30)	21 (70)	1*	
Weak	52 (65)	30 (35)	0.28 (0.08-1.04)	0.061
Average	120 (54.8)	100 (45.2)	1.21 (0.39-3.71)	0.73
Good	42 (70)	18 (30)	0.65 (0.28-2.28)	0.65
Very good	9 (61.1)	6 (38.9)	1.33 (0.41-4.27)	0.62
Maternal toothbrushing frequency				
Less than once a day	21 (24.7)	64 (75.3)	1*	
Once a day or more	204 (63.4)	118 (36.6)	2.3 (1.73-3.06)	0.001
Maternal attitude, mean±SD	24.9±3.6	22±5.1	1.19 (1.12-1.26)	0.001
Age of child (years), mean±SD	5.8±1.5	5.2±1.9	1.35 (1.026-0.73)	0.024

*Reference category, P values were calculated by Wald's Chi-square test. OR: Odds ratio; CI: Confidence interval; SD: Standard deviation

Table 4: Multiple logistic regressions for children's brushing frequency (once a day or more vs. less than once a day) and intendant variables

Variables	OR (95% CI)	Wald statistics	P*
Maternal toothbrushing frequency	2.0 (1.53-2.86)	21.78	0.001
Maternal attitude	1.15 (1.08-1.22)	19.92	0.001
Age of child	1.21 (1.02-1.77)	3.63	0.046

Cox and Snell $R^2=0.19$; Nagelkerke $R^2=0.23$; Goodness of fit: Hosmer and Lemeshow $\chi^2=6.94$, $df=8$, $P=0.543$. *P values were calculated by Wald's Chi-square test. The independents variables that had $P<0.20$ in the simple analysis were included into the multiple logistic regression model. OR: Odds ratio; CI: Confidence interval

health behaviors is an urgent need. "Pattern of oral health behavior-toothbrushing-learned during early years of life is stabilized during preschool age."^[11] Hence, appropriate program to promote oral health behaviors is an urgent need.

The present study has observed a significant association between maternal and children toothbrushing frequency. The logistic regression analysis indicated that mothers' toothbrushing frequency was the significant predicting factor for children's toothbrushing. This finding is consistent with several previous studies that found a significant association between mothers and their children toothbrushing frequency.^[13,16,27]

In a cross-sectional study in southern Taiwan, caregivers' toothbrushing was a significant indicator for the toothbrushing behavior of the children.^[16] In the study by Mohebbi *et al.*, the frequency of oral cleaning for the child was directly related to the mother's toothbrushing frequency.^[13] The brushing habits were mainly introduced by mothers.^[17] Hence, mothers should not only obtain oral health knowledge but also be aware of their role-modeling responsibility to children. Health promotional activities seem necessary for maternal to enhance oral health behavior of their children.

This study showed that child's toothbrushing was significantly associated with maternal attitude toward oral health. In mothers with higher attitude, frequency of children's toothbrushing (once daily or more) was higher as compared to children of mothers with low attitude. This finding confirms other studies; it was found a positive relationship between maternal attitude toward oral health and children's toothbrushing frequency.^[28] Bennadi *et al.* also found maternal attitude as a risk factor for caries prevalence in 3–6-year-old children.^[18] Saied-Moallemi *et al.* also reported a significant relationship between maternal

positive attitude and their third-grade school children's toothbrushing in Tehran city.^[15]

Attitude is one of the predisposing factors toward achieving health promoting behaviors. Health-care professionals should implement programs to increase maternal attitude regarding oral health which could lead to healthy dental habits and promotion in children's brushing.

This study demonstrated a significant relationship between age and toothbrushing frequency. These findings are in line with accordance with earlier findings. A longitudinal study by Wigen and Wang demonstrated toothbrushing twice daily increase in 1.5-year-old children from 52% to 76% in 5-year-old children.^[11] In other studies, once-daily oral cleaning had significant deference with age (18% of 16–23-month-old children vs. 48% of 24–36).^[13] Furthermore, this finding was in line with Maes *et al.*'s study about toothbrushing in adolescents in 32 countries which showed an increase in brushing frequency with age increasing.^[12]

The results of this study showed that majority (38.7%) of children started toothbrushing from about 4 years. According to a study performed in Hong Kong, toothbrushing starting age was reported >24 months for 41% of preschool children.^[24] In a cross-sectional study by Pullishery *et al.*, the mean age of toothbrushing starting was 22.4 months.^[17] The results of these findings about toothbrushing starting age are better than the results of this study finding. This hesitation in starting toothbrushing can be due to the inadequate oral health-related knowledge and dental health-care delivery system for children. The American Academy of Pediatric Dentistry recommends that oral cleaning starting time is no later than the time of eruption of the first primary tooth.^[29]

The results of the simple regression analysis are shown in Table 3. Maternal education level is associated with children toothbrushing frequency, so that children of mothers with higher education are more likely to have better oral health behaviors (OR = 0.509). This finding is consistent with Vallejos-Sánchez *et al.*'s study.^[28] An important socioeconomic indicator is mother education level which reflects knowledge and skills for making health behavior choices such as oral health-related behavior.^[30]

There were some limitations in this study. First, this was a cross-sectional study, and the questionnaire was self-reported that can be a subject to recall error. Furthermore, there was no clinical examination (dental

caries or plaque index) which was the another limitation of this study.

CONCLUSION

Based on the results of this study, toothbrushing frequency was not in desirable status with regard to recommendations. In addition, maternal toothbrushing and attitude were the strongest predictors of child toothbrushing. Hence, health promotion interventions based on mothers training needs about oral health seem necessary. Health providers in health centers, who provide primary health care for mothers and children, need to disseminate educational interventions and accurate information about oral health care for mothers. It is necessary to encourage mothers own regular toothbrushing behavior and promote educational activities through dentists, health-care providers, and pediatrics.

Acknowledgments

The authors appreciate the Education Deputy of Isfahan University of Medical Sciences for their financial support, participants who participated in completing the questionnaires, and the staff of health centers in Tabriz for their cooperation.

Financial support and sponsorship

Nil.

Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or non-financial in this article.

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