Mothers as Facilitators of Preadolescents' Oral Self-Care and Oral Health

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Purpose: This study investigated the role of mothers in their preadolescents' oral self-care (OSC) and oral health in Tehran, Iran.

Materials and Methods: In 2005, two self-administered questionnaires provided data on a random sample of 9-year-old children (N = 416) and their mothers. Brushing frequency, use of fluoridated dentifrice and the number of sugary snacks between meals served as OSC assessment criteria for both children and their mothers. Supervision of the child's tooth brushing and control of the child's sugary snacking indicated the mother's role that was defined as either active or inactive. Decayed, missing or filled teeth (DMFT + dmft) values facilitated the assessment of children's dental status in a voluntary clinical examination for children. The child's twice-daily tooth brushing, sound dentition and good oral hygiene were taken as the outcome measures for evaluating the impact of the mother's role. The chi-square test and logistic regression model were used for the analyses.

Results: Half of the mothers were assessed as active in the supervision of their children's tooth brushing. Supervision was clearly more frequently reported by the mothers whose own OSC was favourable. In the logistic regression model, the strongest factors contributing to the explanation of twice-daily tooth brushing were the child's female gender (odds ratio, OR = 1.6; 95% confidence interval, 95% CI = 1.1 to 2.4) and the mother's active supervision (OR = 1.5; 95% CI = 1.0 to 2.2). Having sound dentition was most strongly explained by the mothers' active supervision of their children's tooth brushing (OR = 2.4; 95% CI = 1.3 to 4.5).

Conclusions: The mothers' supporting role positively reflects on twice-daily tooth brushing and sound dentition in preadolescents. More preventive efforts through mothers should be considered during the planning of promotion programmes for preadolescents.

Key words: behaviour, mother–child relationship, oral health, supervision

Oral Health Prev Dent 2008; 6: 271–277. *Submitted for publication: 19.07.07; accepted for publication: 27.09.07.*

Health practices are woven into the everyday life of family members as they try to establish sustainable routines (Christensen, 2004). In a family, a health-promoting environment, and in particular the influence of parents on their children's oral health is central (Christensen, 2004; Mattila et al, 2005a). The family is a key social institution in the society, where proper development of both child and parental health is undertaken as the primary task (Åstrøm, 1998; Pine et al, 2000). This emphasises the importance of primary socialisation and the transmission of health knowledge and behaviour, especially from mother to child, and suggests that mothers are especially responsible for providing care and support for their children (Okada et al, 2002; Mahejabeen et al, 2006). More than any other social factors and contexts, mothers are considered to be

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very important mediators in their children's health behaviour (Rossow, 1992; Okada et al, 2001).

Tooth brushing requires good manual dexterity and cognitive ability (Choo et al, 2001), and should therefore be performed by an adult for a child up to 6 years of age (Dean and Hughes, 2004). As children grow older, the increase in dexterity and cognition may lead to supervised tooth brushing (Choo et al, 2001; ADA, 2004). Several studies have shown the benefit of good oral hygiene performance and supported tooth brushing in caries reduction in preschool children (Kuriakose and Joseph, 1999; Pine et al, 2000; Rong et al, 2003). Besides the critical period of mixed dentition, early consolidation of health behaviour during preadolescence is important and this age group should be prioritised for more research and intervention programmes (Kelder et al, 1994).

The present study investigated the role of mothers in their preadolescents' oral self-care (OSC) and oral health in Tehran, Iran.

MATERIALS AND METHODS

The subjects

Altogether 16 public schools (eight boys' schools and eight girls' schools) were selected from a list supplied by the Ministry of Education to obtain a representative sample of 9-year-old primary school children. From each school, one third-grade class was randomly selected, and all children with their mothers were included. The sample included 459 children (225 boys and 234 girls) and their mothers. The protocol was approved by the Ethics Committee of the Shaheed Beheshti University, Tehran, Iran.

The present data were based on the clinical examination of the children and two self-administered questionnaires: one for the children and the other for the mothers. All the children completed their questionnaires under supervision in the class. Each child was then asked to take home a cover letter and the mother's questionnaire that had to be completed and returned to school within 2 days; 416 (91%) of the mothers responded. Further details have been described elsewhere (Saied-Moallemi et al, 2006).

Clinical examinations

Clinical examinations were performed based on the World Health Organization (WHO) criteria for recording the oral health of children (WHO, 1997) using a disposable mouth mirror, a community periodontal index (CPI) probe, and a blue and white headlamp under natural light in the health office at school. Dental status was recorded tooth by tooth for assessing decayed, missing or filled teeth (DMFT and dmft) indices. For the present study, the sum of DMFT + dmft was calculated and then categorised into the following: 0 (sound dentition), 1 to 3, 4 to 7 and 8 to 16 (high-caries subjects). The children's oral hygiene was assessed by plaque measurement (the scores given in parentheses) and was recorded for each of the six index teeth as no plaque (0), plaque on gingival margin only (1), and plaque elsewhere (2). The sum of plaque scores was calculated and, according to its distribution, the child's oral hygiene was categorised as good, fair or poor.

The child's questionnaire

Questions about the OSC of the child covered the frequency of tooth brushing, the consumption of sugary snacks between meals and the use of fluoridated dentifrice. The question 'How often do you usually brush your teeth?' offered five alternatives, irregularly or never (0), once in a week (0), a few times in a week (1), once daily (3) and twice daily or more (6), with the scores given in parentheses. The question 'How often do you have sugary snacks and drinks between your main meals?' offered five options for answers: three times a day or more (0), twice a day (0), once a day (1), occasionally, not everyday (2), and rarely or never (3). The question 'Do you use a fluoridated dentifrice while brushing?' had four alternatives: never (0), seldom (0), often (2) and always or almost always (5). The sum of the scores from these three questions described the child's OSC, and the higher scores indicated more favourable behaviour. The frequency of tooth brushing was then categorised according to twice daily or more, once daily and less frequently, and further dichotomised into twice daily and less. Sugary snacking was dichotomised into once daily or less and more than once daily.

The mother's questionnaire

The mother's role in maintaining the child's OSC included 'supervision of the child's tooth brushing' and 'control of the child's sugary snacking'. The corresponding questions were 'How often do you supervise your child's tooth brushing?' and 'How often

Table 1 The mothers' role in maintaining the oral health of 9-year-olds (N = 410), as distributions (%) according to the mothers' level of education and OSC

Aspects of the mothers' role		Mothers' level of education[a]				Mothers' OSC[b,c]			
	All	Low	Medium	High	*P*	Unfavourable	Moderate	Favourable	*P*
	(N = 410) 100%	(n = 123) 31%	(n = 191) 48%	(n = 85) 21%		(n = 161) 40%	(n = 187) 46%	(n = 57) 14%	
Supervision of the child's tooth brushing					0.001				0.05
Always or almost always	12	17	11	6		11	9	23	
Often	40	35	40	46		41	37	42	
Seldom	38	30	42	45		39	41	30	
Never	10	18	7	3		9	13	5	
Control of the child's sugary snacking					0.01				0.11
Always or almost always	10	12	10	7		8	9	16	
Often	47	43	45	59		43	49	57	
Seldom	32	27	38	26		38	30	22	
Never	11	18	7	8		11	12	5	

Statistical evaluations by chi-square test.
[a]Data missing for 11 subjects. [b]Data missing for 5 subjects. [c]Favourable behaviour included: twice-daily tooth brushing, regular use of fluoridated dentifrice and eating sugary snacks once daily or less. Moderate behaviour included two and unfavourable behaviour included less than two of the favourable OSC practices.

do you restrict your child's frequency of consumption of sugary snacks and soft drinks?' For both the questions, the alternatives were as follows: (a) always or almost always, (b) often, (c) seldom, and (d) never. These were then categorised to indicate the mother's role as active (a and b) or inactive (c and d), separately for the supervision of tooth brushing and control of sugary snacking (six mothers did not answer these questions).

Mothers were to answer questions on OSC similar to that of their children; the mothers' OSC was then defined as favourable, moderate or unfavourable. Favourable OSC included tooth brushing twice daily, always or almost always using fluoridated dentifrice and eating sugary snacks once daily or less. Moderate OSC included two of the OSC behaviours reported for favourable OSC, and unfavourable OSC included no more than one of these favourable OSC behaviours.

The questionnaire enquired about the levels of education for fathers and mothers separately. For further analysis, the parents' level of education was defined as the highest level of either parent's education. Separately, the mothers' education was categorised into three levels: (a) low (illiterate, primary or intermediate schools), (b) medium (high school or diploma) and (c) high (university degree).

Statistical analysis

A basic statistical evaluation was performed with the chi-square test for differences in frequencies. Logistic regression models were fitted to the data to explain relationships between the mother's role in their children's twice-daily tooth brushing, good oral hygiene and sound dentition. The relationships were determined with odds ratio (OR) and 95% confidence interval (95% CI).

RESULTS

Twelve per cent of the mothers reported that they always supervise their children's tooth brushing, whereas ten per cent said that they never do so. Regarding the children's sugary snacking, 10% of the mothers reported that they always control it, whereas 11% said that they never do so (Table 1).

OSC was favourable for 14% of the mothers, moderate for 46% and unfavourable for 40% (Table 1). Supervision of the children's tooth brushing was more frequently reported by the mothers whose own OSC was favourable. With regard to the children's sugary snacking, no such difference was seen.

Table 2 The distribution (%) of 9-year-old boys (n = 204) and girls (n = 206) by their frequency of tooth brushing, and indicators of oral health according to the level of the mother's reported supervision of the child's tooth brushing

Child's tooth brushing and oral health	Supervision of the child's tooth brushing					
	Boys			Girls		
	Active[a] (n = 107) %	Inactive[b] (n = 97) %	*P*	Active[a] (n = 104) %	Inactive[b] (n = 102) %	*P*
Frequency of tooth brushing			0.35			0.003
Twice daily or more	38	42		63	39	
Once daily	36	27		23	33	
Less frequently	26	31		14	28	
Oral hygiene[c]			0.39			0.18
Good	10	12		21	19	
Fair	34	41		42	32	
Poor	56	47		37	49	
DMFT + dmft			0.47			0.01
0	14	8		22	9	
1–3	27	26		36	29	
4–7	46	47		32	49	
≥ 8	13	19		10	13	

Statistical evaluations by chi-square test.
[a]Active supervision: always or often. [b]Inactive supervision: seldom or never. [c]Oral hygiene: sum of plaque recording for the six index teeth with a range from 5 to 12.

Table 3 Reporting of twice-daily tooth brushing among 9-year-olds as explained by the mother's supervision of the child's tooth brushing, the mother's OSC and sociodemographic characteristics by means of a logistic regression model

	Estimate	SE	*P*	OR	95% CI
Active supervision of the child's tooth brushing	0.384	0.207	0.06	1.5	1.0–2.2
Mother's OSC[a]	0.102	0.037	0.006	1.1	1.0–1.2
Child's gender (0 = boy, 1 = girl)	0.482	0.206	0.02	1.6	1.1–2.4
Parents' education	0.019	0.076	0.8	1.0	0.9–1.2
Constant	−1.569	0.414			

Goodness-of-fit (Hosmer–Lemeshow test) *P* = 0.21.
[a]Favourable OSC included: twice-daily tooth brushing, regular use of fluoridated dentifrice and eating sugary snacks once daily or less.

Altogether 52% of the mothers were assessed as active in the supervision of their children's tooth brushing and 57% in the control of sugary snacking with no difference found between boys and girls.

The highest rate (63%) of twice-daily tooth brushing occurred among girls whose mothers were assessed as active in the supervision of their children's tooth brushing; no such difference was found for boys (Table 2).

Oral hygiene was good for 15%, fair for 38% and poor for 47% of the children; more girls showed good oral hygiene than boys ($P = 0.03$). The mothers' activity in the supervision of their children's tooth brushing made no difference in the children's level of oral hygiene (Table 2).

Fourteen per cent of the children had sound dentition (DMFT + dmft = 0) and thirteen per cent were high-caries subjects (DMFT + dmft ≥ 8); no difference in values was found with regard to the gender of the children. Sound dentition was more prevalent (22% versus 9%) among the girls whose mothers were active in supervising their children's tooth brushing; no such difference was verified for boys (Table 2). Regarding mothers' control of sugary

Table 4 The presence of good oral hygiene* or sound dentition (DMFT + dmft = 0) among 9-year-olds attributed to the mother's supervision of their child's tooth brushing, both the mother's and child's OSC and sociodemographic characteristics by means of two logistic regression models

	Estimate	SE	*P*	OR	95% CI
Model for good oral hygiene					
Active supervision of the child's tooth brushing	−0.066	0.280	0.8	0.9	0.5–1.6
Mother's OSC[a]	0.013	0.050	0.8	1.0	0.9–1.1
Child's OSC[a]	0.176	0.072	0.01	1.2	1.0–1.4
Child's gender (0 = boy, 1 = girl)	0.517	0.289	0.07	1.7	0.9–3.0
Parents' level of education	−0.078	0.105	0.5	0.9	0.8–1.1
Constant	−3.775	0.902			
Goodness-of-fit[b] (*P* = 0.46)					
Model for sound dentition					
Active supervision of the child's tooth brushing	0.869	0.323	0.007	2.4	1.3–4.5
Mother's OSC[a]	0.005	0.054	0.9	1.0	0.9–1.1
Child's OSC[a]	0.023	0.072	0.8	1.0	0.9–1.2
Child's gender (0 = boy, 1 = girl)	0.414	0.313	0.2	1.5	0.8–2.8
Parents' level of education	0.004	0.109	1.0	1.0	0.8–1.2
Constant	−2.949	0.886			
Goodness-of-fit[b] (*P* = 0.62)					

*Good oral hygiene is the lowest 15% of the sum of the plaque recording for the six index teeth.
[a]Favourable OSC included: twice-daily tooth brushing, regular use of fluoridated dentifrice, and eating sugary snacks once daily or less. [b]Hosmer–Lemeshow test.

snacking, no differences were found in their children's oral health.

The data in Table 3 illustrate the impact of the mother's role on the child's twice-daily tooth brushing by means of a logistic regression model. The factors with the strongest impact on twice-daily tooth brushing were female gender (OR = 1.6; 95% CI = 1.1 to 2.4), the mother's active role in supervision (OR = 1.5; 95% CI = 1.0 to 2.2) and a favourable OSC (OR = 1.1; 95% CI = 1.0 to 1.2). When the same model was fitted separately for boys and girls, the strength of these factors increased in the model for girls and disappeared in the model for boys.

The data in Table 4 show the impact of the mother's role on the child's good oral hygiene and sound dentition by means of two logistic regression models. Good oral hygiene was associated with female gender (OR = 1.7; 95% CI = 0.9 to 3.0) and a favourable OSC (OR = 1.2; 95% CI = 1.0 to 1.4). The mother's activity in the supervision of the child's tooth brushing showed no impact on the child's good oral hygiene.

Mother's active role in her supervision of the child's tooth brushing best explained (OR = 2.4; 95% CI = 1.3 to 4.5) the condition of the child having sound dentition; the child's own OSC demonstrated no impact. In the separate models for boys and girls, the impact of attaining sound dentition through the mother's supervision of the child's tooth brushing increased in the model for girls and disappeared in the model for boys.

DISCUSSION

The present study suggested that the mothers' supervision facilitates twice-daily tooth brushing in their preadolescents. Furthermore, the mothers' active supervision was strongly associated with their children's sound dentition at this age. The mother's role seems to be especially important for girls. The mother's role had no impact on the oral hygiene of the children. Moreover, the mothers' active role was associated with their own favourable OSC.

Parental support improves the oral health of children and adolescents, although a different kind of support is needed throughout one's lifespan. Parents' regular inspection and assistance in their children's tooth brushing are significant factors in twice-daily tooth brushing and in reducing dental caries in preschool children (Kuriakose and Joseph,

1999; Pine et al, 2000). On the other hand, a close and supportive relationship between parents and their preadolescents contributes to the development of good oral hygiene performance in late adolescence (Åstrøm, 1998). Although preadolescents of school age tend to be more independent than younger children, they are nevertheless unable to brush their teeth adequately by themselves (Dean and Hughes, 2004). The present results revealed that parental supervision is still needed in sustaining twice-daily tooth brushing and in preserving sound dentition in preadolescents.

The critical period for establishing attitudes and beliefs that shape each individual's health behaviour practice extends through preadolescence into adolescence (Nutbeam et al, 1989). Maladapted health behaviours that arise during childhood and preadolescence are not likely to change beyond adolescence (Kelder et al, 1994). Furthermore, this age represents a key opportunity to take advantage of the important role of mothers on their children's oral health (Okada et al, 2001). These studies indicate the need to coincide research and promotion programmes with the critical period of development of individual health behaviour during preadolescence.

The mothers' level of education was associated positively with their role regarding their children's tooth brushing and sugary snacking. Researchers have shown a relationship between the mother's level of education and other aspects of her children's oral health (Mascarenhas, 1999; Mattila et al, 2005b). In the present study, however, mothers with a low level of education more frequently reported that they 'always' supervise their children's tooth brushing and control their sugary snacking. Undesirable oral health conditions among the less educated (Petersen, 2005; Hessari et al, 2007) may have encouraged them to instil better oral health behaviours in their children. From a psychological point of view, a perceived threat of dental disease predicts this preventive behaviour among mothers (Pine et al, 2000; Health Belief Model, 2007).

The present study shows that the mothers with a favourable OSC reported frequent supervision of their children's tooth brushing. This evidence suggests that the mothers' own oral health behaviour impacts their sense of responsibility regarding their children's oral health behaviour. The perceived benefits of good oral health explain the mothers' supporting behaviour (Pine et al, 2000; Health Belief Model, 2007). In addition, the mothers' OSC showed a direct impact on their childrens' twice-daily tooth brushing.

Although the mothers reported supervising their children's tooth brushing similarly for both genders, girls benefited more from favourable tooth brushing behaviour and sound dentition. This finding supports the previous result indicating that parental influences vary according to the child's gender (Poutanen et al, 2006). Gender linking in the relationship between the OSC of parents and children, which was shown by Åstrøm (1998), is consistent with the present findings among girls supervised by mothers. This may explain why girls generally had better self-perceived oral health (Östberg et al, 2001) and how they practised more favourable oral health behaviour (Poutanen et al, 2005).

Children seemed to have benefited from their mothers' supervision for their twice-daily tooth brushing and for having better dental health. This advantage did not, however, affect their oral hygiene. Mothers may supervise whether or not their children brush, but not how they brush. Furthermore, mothers may be unable to identify the presence of dental plaque with a superficial glance at their children's teeth. Sound dentition in the supervised children may be due to their exposure to fluoridated dentifrice, which contributes to reducing dental caries more than to oral cleanliness (Yee et al, 2006).

Our results showed that mothers' controlling for sugary snacking had no impact on their children's consumption of sugary snacks. Mothers emphasise tooth brushing over dietary habits (Kinnby and Widenheim, 1994), probably due to the overemphasis on tooth brushing methods in oral health instructions at the expense of highlighting the relationship between sugar and dental caries.

Researchers consider sugary snacking as a primary socialisation of the family (Åstrøm, 1998), and a secondary socialisation of school, the media and peer groups (Rise and Hølund, 1990). The availability of sugary snacks in small shops at school, the widespread advertisements on TV and the affordability of sugary items induces the consumption of sugary snacks and may diminish the mothers' control over them. Cooperation between the school and the home fosters a supportive community environment for improving the children's behaviour with regard to sugary snacking.

CONCLUSIONS

Mothers' supporting behaviour positively reflects on twice-daily tooth brushing and good dental health among preadolescents. During the planning of pro-

motional programmes that target preadolescents, more preventive efforts should be considered regarding the mothers' role.

ACKNOWLEDGEMENT

The cooperation of the staff and the pupils of the participating primary schools is gratefully acknowledged.

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