Effect of social-behavioral factors on dental caries in 3-6-year-old children in Kerman, Iran

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Original Article

Abstract

BACKGROUND AND AIM: Dental caries is a multifactorial disease with a complex etiology. The social-behavioral factors play an important role in development of dental caries. This study aimed to evaluate the effect of social-behavioral factors on dental caries in 3-6-year-old children in Kerman, Iran.

METHODS: This cross-sectional descriptive-analytical study was conducted on 857 children aged 3-6 years. Data collection tools were clinical examination and a form which contained two sections. The first section included demographic characteristics of children and record of their decayed, missing, and filled teeth (DMFT) index, whereas the second section contained questions on social-behavioral factors of children and parents, which were designed in four areas of oral health service system, as well as environmental, social-cultural, and risk behaviors factors. Data analysis was performed by SPSS software using statistical tests, analysis of variance (ANOVA), t-test, and multiple linear regression model. In addition, P-value of 0.0500 was considered significant.

RESULTS: In this research, 456 subjects were female and 401 were male. Moreover, mean age of the children was 4.76 ± 1.04 years. A significant relationship was observed between the mean DMFT index and level of education and marital status of parents (P = 0.001). Children of parents with higher education and occupational status had lower mean DMFT index. On the other hand, a significant association was found between mean DMFT index and the variables of milk consumption at night (P = 0.001), consumption of sweets and biscuits (P = 0.038), and use of toothbrush (P = 0.005) and dental floss (P = 0.001). Furthermore, a significant relationship was observed between the mean DMFT index and age of children (P = 0.001).

CONCLUSION: Despite the advancements made in social, cultural, economic, and health aspects of treatment over the past few years, there is still a direct relationship between social-behavioral factors and dental caries in preschool children.

KEYWORDS: Dental Caries; Social Factors; Behavioral Factors; Preschool Children

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Aconsiderable share of oral diseases in the world is allocated to dental caries.[1] Generally, changes in oral hygiene of children are low in developing countries and dental caries are still found in a significant percentage of children.[2-5] Risk of social-behavioral factors of dental caries is described in a model by the World Health Organization (WHO), which includes oral healthcare service system, risk behaviors (oral hygiene and sugar consumption) as well as environmental (drinking water, sewage system, hygiene, nutritional status) and social-cultural (level of education, occupational status, level of income, race, life style, support of social

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networks) risk factors.[6] According to the literature, environmental and socioeconomic factors are significant determinants of oral and dental diseases.[7] Casanova-Rosado et al. conducted a research in Mexico, concluding that the frequency of daily tooth brushing was higher in children who had dental visits during the last year. On the other hand, the frequency of daily tooth brushing was lower in children of large families and those without dental visits in the past year.[8]

In a research on six-year-old children in India, Tadakamadla et al. demonstrated a relationship between the experience of dental caries and parental occupational status and level of education.[4] Some studies have shown that children with lower socioeconomic levels had higher incidence of dental caries. On the other hand, children of parents with high salaries and levels of education were less at risk of dental caries.[2,9] Evidence shows a considerable association between Significant Caries Index (SiC Index) of students and the variables of gender, number of family members, level of education of mothers, frequency of brushing, and use of fluoride mouthwash.[10] In a research by Peltzer et al., risk factors related to dental caries were presented to be low socioeconomic status, frequent consumption of sweets, unfavorable amount of fluoride in water resources, and irregular tooth brushing.[6] Due to the cultural, behavioral, and social differences in various societies and countries in the field of nutrition, oral hygiene, and oral healthcare services, the type of factors affecting dental caries in children can vary in different societies. With this background in mind, this study aimed to evaluate the effect of social-behavioral factors on dental caries in children aged 3-6 years in Kerman, Iran.

Methods

This cross-sectional descriptive-analytical research was conducted on 857 children aged 3-6 years in kindergartens of Kerman City in 2016. The study protocol was approved by the Ethics Committee of Kerman University of Medical Sciences (IR.KMU.REC.1395.190). Inclusion criteria were lack of systematic diseases and orthodontic appliances, and living with at least one of the parents. Subjects were selected through multistage sampling. In the first stage, names of all kindergartens of districts one and two of Kerman City were collected from the welfare organization. Given the difference between the children of these two districts in terms of cultural, economic, and social status, participants were selected from both districts. At first, 22 kindergartens were randomly selected from the two districts, followed by random selection of eligible students from the list of names of children with regard to the sample size of the research. At first, a briefing was held for parents of the children in one of the kindergartens to explain about the objectives and importance of the research. Written informed consents were obtained from the parents who were willing to participate in the research. All stages of the study were performed by a trained senior dental student.

In addition, parents were ensured of voluntary participation, meaning that they could withdraw from the research at any time. Data collection tools were clinical examination and a form which consisted of two sections. The first section was related to the demographic characteristics of children (i.e., age, gender, and parental occupational status and level of education) and record of decayed, missing, and filled teeth (DMFT) index (number of decayed, restored, and lost deciduous teeth due to dental caries) according to the WHO criteria. The second section contained questions related to the social-behavioral factors of children and their parents designed in four dimensions,[11] including oral health service system (two items), as well as environmental (three items), social-cultural (ten items), and risk behaviors (five items) factors. To assess validity, the data collection form was given to 10 pediatric dentists and their comments were applied in the questionnaire. The

content validity of the questionnaire was calculated using the content validity index (CVI) as 0.86, which was approved. Subjects were categorized based on DMFT index (DMFT > 4, DMFT < 2, and 4 > DMFT > 2), and were defined as children with high, moderate, and low decay condition.[12]

On the other hand, clinical examination was carried out by trained senior dentistry students with the use of dentistry mirror and under natural light to record the DMFT index of each participant in the form.[13] Before the process, teeth surface of children was cleaned with gauze, if required.[14] After clinical examination, the data collection forms were provided for parents to answer the questions. In addition, all dental and oral problems of the subjects were announced to their parents after examination and oral health principles were described. Following that, the participants were referred to clinics and school of dentistry to receive treatment or preventive measures. Data analysis was performed by SPSS software (version 19, SPSS Inc., Chicago, IL, USA) using descriptive tests, analysis of variance (ANOVA), t-test, and regression model. The ANOVA and t-test were used to investigate the relationship between DMFT index with age and sex. The multiple linear regression analysis was performed to determine the relationship between the factors related to DMFT. Furthermore, P-value of 0.0500 was considered significant.

Results

In this research, the majority of form fillers (85.3%, n = 731) were mothers, and only 10 (1.2%) forms were filled by both parents. In terms of level of education, most of the mothers (58.0%) had diploma degree, whereas most of the fathers (53.0%) had Bachelor of Science (BSc) degree. In addition, the majority of fathers (62.3%) were self-employed and most of mothers (43.8%) were housewives (Table 1). Furthermore, mean age of the subjects was 4.76 ± 1.04 years. Mean and standard deviation (SD) of DMFT index was 3.70 ± 2.00 in all subjects, specifically 3.71 ± 1.91 in male subjects and 3.72 ± 2.07 in female participants.

Table 1. Relationship between decayed, missing, and filled teeth (DMFT) index and demographic characteristics

Variable		Frequency n (%)	DMFT indicator Mean ± SD	P
Gender	Female	456 (53.2)	3.72 ± 2.07	0.964
	Male	401 (46.8)	3.71 ± 1.91	
Level of education of fathers	Below diploma	56 (6.5)	4.37 ± 1.89	0.001[*]
	Diploma	280 (32.8)	4.18 ± 1.98	
	BSc	454 (53.0)	3.49 ± 1.96	
	Higher education	66 (7.7)	2.59 ± 1.78	
Level of education of mothers	Illiterate	2 (0.2)	5.00 ± 0	0.001[*]
	Below diploma	90 (10.5)	4.52 ± 2.12	
	Diploma	497 (58.0)	4.01 ± 1.90	
	BSc	250 (29.2)	2.86 ± 1.84	
	Higher education	18 (2.1)	2.77 ± 2.21	
Occupational status of fathers	Self-employed	534 (62.3)	3.97 ± 1.95	0.001[*]
	Employee	281 (32.8)	3.33 ± 2.09	
	Unemployed	15 (1.8)	3.53 ± 2.09	
	Physician-dentist	20 (2.3)	2.35 ± 1.56	
	No answer	7 (0.8)	-	
Occupational status of mothers	Housewife	375 (43.8)	3.97 ± 1.95	0.001[*]
	Self-employed	352 (41.1)	3.63 ± 1.99	
	Employee	123 (14.4)	3.17 ± 2.06	
	Physician-dentist	7 (0.8)	2.16 ± 2.04	

[*]$P < 0.050$
BSc: Bachelor of Science; SD: Standard deviation

Table 2. Relationship between decayed, missing, and filled teeth (DMFT) index and high-risk factors and behaviors

Variable		Frequency n (%)	DMFT indicator Mean ± SD	P
Milk consumption at night during the first two years	Yes	447 (52.2)	3.89 ± 2.00	0.001*
	No	374 (43.6)	3.43 ± 1.96	
	No answer	36 (4.2)	-	
Nutrition status in the first two years	Breast milk	351 (41.0)	3.87 ± 2.02	0.123
	Bottle	366 (42.7)	3.58 ± 2.02	
	Both	140 (16.3)	3.63 ± 1.58	
Consumption of sweets and biscuits	Once a day	336 (39.2)	3.88 ± 2.04	0.038*
	More than once a day	201 (23.5)	3.43 ± 1.95	
	Irregular	320 (37.4)	3.70 ± 1.97	
Use of toothbrush	Once a day	321 (37.5)	3.67 ± 1.93	0.005*
	More than once a day	435 (40.3)	3.86 ± 2.10	
	Irregular	162 (18.9)	3.60 ± 1.87	
	Never	29 (3.4)	2.41 ± 1.88	
Use of dental floss	Once a day	172 (20.1)	3.54 ± 1.96	0.001*
	More than once a day	137 (16.0)	3.11 ± 2.01	
	Irregular	229 (26.7)	3.99 ± 1.95	
	Never	319 (37.2)	3.70 ± 2.00	

*P < 0.050, SD: Standard deviation

According to the categorization of DMFT index,[12] all of the children had moderate to high caries conditions. According to the results of ANOVA and t-test analysis, no statistically significant difference was observed between the genders (P = 0.964). However, a significant association was found between DMFT index and age of the subjects. In this regard, higher DMFT mean was found in older children.

The relationship between the DMFT index and risk behaviors and factors is presented in table 2. In total, 532 subjects had never visited a dentist. On the other hand, 592 participants participated in the fluoride therapy or fissure sealant plan. The association between DMFT index and use of health system is shown in table 3.

In this study, most of the participants lived in a three-member family (54.1%). According to the results of multiple linear regression analysis, a statistically significant relationship was observed between level of income of parents and DMFT index of children (P = 0.001); so that, the children of parents with an income of above five million tomans had less DMFT index. The relationship between DMFT index and social-cultural risk factors is demonstrated in table 4. In addition, the association between DMFT index of the subjects and variables of maternal age, birth weight, and presence of caries in maternal teeth is shown in table 5.

Table 3. Relationship between decayed, missing, and filled teeth (DMFT) index and use of health system

Variable		Frequency n (%)	DMFT indicator Mean ± SD	P
Visiting a dentist	Never	352 (41.1)	3.90 ± 1.98	0.066
	One-two times in the last year	373 (43.5)	3.60 ± 2.00	
	More than two times in the last year	99 (11.6)	3.60 ± 2.09	
	No opinion	33 (3.9)	3.13 ± 1.73	
Participation in fluoride therapy or fissure sealant plan in kindergarten	Yes	592 (69.1)	3.71 ± 2.05	0.285
	No	188 (21.9)	3.81 ± 1.90	
	No opinion	77 (9.0)	3.38 ± 1.83	

SD: Standard deviation

Table 4. Relationship between decayed, missing, and filled teeth (DMFT) index and social-cultural risk factors

Variable		Frequency n (%)	DMFT indicator Mean ± SD	P
Level of income	Below one million tomans	341 (39.8)	4.40 ± 1.91	0.001*
	Between one-five million tomans	337 (39.3)	3.32 ± 1.99	
	Above five million tomans	179 (20.9)	3.11 ± 1.80	
Separation of parents	Yes	40 (4.7)	3.17 ± 1.74	0.093
	No	817 (95.3)	3.73 ± 2.01	
Living with parents	Father	6 (0.7)	4.16 ± 1.60	0.311
	Mother	24 (2.8)	3.00 ± 1.71	
	Father and mother	820 (95.3)	3.72 ± 2.01	
	Mother, grandparents	5 (0.6)	2.50 ± 1.73	
	Father, grandparents	2 (0.2)	2.50 ± 0.71	
Number of family members	Two	22 (2.6)	3.31 ± 1.78	0.670
	Three	464 (54.1)	3.73 ± 1.94	
	Four	229 (26.7)	3.76 ± 2.04	
	Five	73 (8.5)	3.73 ± 2.14	
	Six	35 (4.1)	4.02 ± 2.07	
	Seven	7 (0.8)	2.85 ± 1.95	

*P < 0.050, SD: Standard deviation

Results were also indicative of a significant relationship between DMFT index of the participants and maternal age and caries presence. So that, the children of younger mothers with more caries had higher DMFT index.

Discussion

The socioeconomic level is a key factor in determining the need for dental treatments and the prevalence of dental caries.[15] In the current research, which was conducted on 3-6-year-old children in Kerman City, mean and SD of DMFT index was 3.70 ± 2.00, whereas means of D, M, and F indicators were 2.27 ± 1.46,

0.87 ± 0.55, and 0.88 ± 1.14, respectively. As observed, there was a high mean of dental caries and low mean of restored teeth, which is in line with the results obtained by Borges et al.[2] The higher rate of dental caries might be due to inadequate parental awareness of importance of deciduous teeth in growth and development of permanent teeth. In the current research, no significant difference was observed between the male and female subjects in terms of mean DMFT index, which is consistent with the results obtained by Casanova-Rosado et al., who reported no significant association between mean DMFT index and gender of the subjects.[3]

Table 5. Relationship between decayed, missing, and filled teeth (DMFT) index and environmental risk factors

Variable		Frequency n (%)	DMFT indicator Mean ± SD	P
Birth weight (kg)	Below 2.5	483 (56.4)	3.72 ± 1.94	0.962
	Above 2.5	374 (43.6)	3.71 ± 2.07	
Maternal caries presence	Pit-and-fissure caries	430 (50.2)	3.80 ± 1.93	0.024*
	No caries	327 (38.2)	3.38 ± 2.11	
	No opinion	100 (11.6)	4.04 ± 1.83	
Drinking water resource	Tap water	735 (85.5)	3.71 ± 1.97	0.354
	Mineral water	8 (0.9)	3.12 ± 1.45	
	Purified water	104 (12.1)	3.82 ± 2.13	
	All types	10 (0.8)	2.28 ± 2.87	
Maternal age (year)	14-24	218 (25.4)	4.08 ± 2.01	0.001*
	25-35	572 (66.7)	3.64 ± 1.99	
	36-46	55 (6.4)	2.78 ± 1.71	
	No response	12 (1.4)	-	

*P < 0.050, SD: Standard deviation

However, there is a lack of consistency between our findings and the results obtained by Eskandarizadeh et al., who found a significant difference between male and female 6-year-old children and their mean DMFT index in Kerman; so that, the boys had higher DMFT index.[16] This contrast might be due to the difference in the population of studies, since DMFT index of children aged six years was assessed in the aforementioned research. In the present study, a significant relationship was observed between mean DMFT index and variables of parental occupational status and level of education. According to the results, children of parents with higher education had lower mean DMFT index. In this regard, our findings are in congruence with the results obtained by Kumar et al.,[9] Li et al.,[17] Nematollahi et al.,[18] Kiwanuka et al.,[19] and Pakpour et al.[20] in Iranian adolescents.

On the other hand, Casanova-Rosado et al. marked that children of mothers with higher education had lower number of dental caries.[3] It seems that higher levels of education increased parental awareness of oral health and led to greater attention to the oral health of their children, thereby improving their oral health index. In the current research, the parental occupational status had a significant impact on DMFT index. In studies by Tadakamadla et al.[4] and Narang et al.,[21] parental occupation status significantly changed the dental caries in children, in a way that dental caries was observed in a small number of children of parents with higher level of occupation; so that, the children of parents who had professional occupations had less DMFT index than children of unemployed parents. In this respect, our findings are not consistent with the results obtained by Eskandarizadeh et al.[16] and Tanaka et al.,[22] which demonstrated lack of observing a significant relationship between parental occupational status and DMFT index of children, and also with the study by Torabi et al.,[23] in which the lack of a significant association between parental occupational status and the SiC index of 7-year-old children was reported. This lack of consistency might be due to the sample populations of the studies.

According to the results of the current research, a statistically significant relationship was observed between milk consumption at night during the first two years of life and DMFT index of children aged 3-6 years. In a research by Vejdani et al., a significant relationship was found between early childhood caries (ECC) and milk consumption at night. Drinking milk at night prolongs exposure to fermentable carbohydrates and creates an improper oral environment during sleep, which can cause dental caries.[24] In the current study, a significant relationship was observed between DMFT index and consumption of sweets, which is in congruence with the results obtained by Vejdani et al.,[24] Naidu et al.,[25] and Alshehri.[26] Increased consumption of sweets leads to higher risk of enamel demineralization and shorter duration of remineralization by saliva. After that, demineralization becomes the dominant phenomenon. Initiation of consumption of sweet foods and drinks at early ages can turn this act into a habit in adulthood.[24] According to the results of the present study, a significant relationship was observed between DMFT index and use of toothbrush and dental floss, which is consistent with the results obtained by Tadakamadla et al.,[4] Naidu et al.,[25] Alshehri,[26] and Sajadi et al.[27]

In the present research, 41.1% of the subjects never visited a dentist. In this regard, a significant association was found between mean DMFT index and visiting a dentist. In general, the DMFT index of children who never visited a dentist was higher. In a research by Kiwanuka et al., a great number of children never visited a dentist.[19] In the study by Tadakamadla et al. in India, 93.3% of the participants never visited a dentist.[4] Generally, visiting a dentist can increase the people's awareness of the current oral situation of children, leading to the treatment

of present caries and prevention of oral and dental problems and losing teeth. In the present research, no statistical relationship was found between the type of drinking water and mean DMFT index. Given the fact that the drinking water of 85.5% of the cases was tap water, it seems that water resource had no significant impact on DMFT index. In a research by Peltzer et al. in Thailand, consumption of fountain and rain water led to increased dental caries.[6] In addition, a significant relationship was observed between mean DMFT index and maternal age at the birth of neonate. Generally, children of younger mothers had higher DMFT index. It seems that younger mothers have low level of knowledge about oral health of children, and increase of age is associated with more experience in this respect, which leads to improved dental condition of children.[28]

In the current research, a significant relationship was found between level of income of families and mean DMFT index. In general, the dental situation of children was better in families with higher level of income. Given the high expenses of dental treatments, parents with low level of income fail to treat the dental and oral problems of their children. In two researches by Al-Mohammadi et al.[29] and Amanlou et al.[30] a reverse relationship was observed between economic status of parents of pre-elementary children and incidence of dental caries, which is in line with our findings. Moreover, a significant association was found between maternal dental caries at birth and mean DMFT index of children. It was demonstrated that poor oral hygiene of parents and frequency of consuming sweets increased the possibility of maternal-neonatal infection transfer.[31,32] In the present research, no statistical relationship was observed between the separation of parents and mean DMFT index of the evaluated subjects. In a study by Wigen and Wang, change of the condition of the family (from two parents to one parent) might affect the ability of parents to properly perform oral cares, increasing the risk of

dental caries in children.[32]

On the other hand, no association was found between birth weight and mean DMFT index, which is in contrast with the results obtained by Peltzer et al., who marked a relationship between low birth weight and increased dental caries.[6] Furthermore, no significant relationship was observed between the use of fluoride therapy and fissure sealants and mean DMFT index. Given the fact that fluoride therapy and fissure sealants has been recently stablished in the form of a national plan, its impact on reduction of dental caries in children is still not tangible. In addition, no significant association was observed between the number of family members and DMFT index. Studies have shown that increased number of children in a family leads to lack of proper attention to children and more focus on the first child, which can have negative effect on oral health of children.[28,32] In the study by Eskandarizadeh et al., no significant relationship was observed between the number of children and mean DMFT index.[16] In the current research, a significant relationship was found between age of children and mean DMFT index, in a way that older children had higher DMFT index. This might be due to more exposure to factors of dental caries at older ages, which leads to an increased number of dental caries as well as filled or lost teeth. The limitations of this study were the large sample size, lack of cooperation of children for examination, and lack of cooperation of parents in giving information about their occupation and income.

Conclusion

According to the results of the current research, social-behavioral factors had significant associations with DMFT index of preschool children in all four dimensions of oral health service system, as well as environmental, social-cultural, and risk behavior factors, including maternal dental caries at birth of children, maternal age, level of income of family, consumption of milk at

night, consumption of sweets, use of toothbrush and dental floss, and parental level of education and occupational status.

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