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Oral Health status in traditional and health: Promoting primary schools in Iran

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***Abstract*---**Background and Aim: Periodontal diseases and dental caries are two of the most common oral health problems. The present study was carried out to evaluate the oral and dental health indices of sixth grade primary school students. Materials and Methods: In this cross-sectional study, 162 male and female students were randomly selected in two steps from traditional primary schools and health-promoting schools (HPSs) in Hashtgerd City, Alborz Province, Iran. Demographic information and oral health behaviors were recorded. Examinations were performed by one person, and the decayed, missing, and filled teeth (DMFT) index and oral hygiene index simplified (OHI-S) were checked and recorded in the standard form of the World Health Organization (WHO). Data were analyzed by the t-test and Pearson correlation coefficient. Findings: The mean DMFT was 1.83 ± 2.17. There was no significant difference between genders. The mean OHI-S was 1.40 ± 0.57. Oral hygiene was good for girls, and it was moderate for boys, in which this difference was significant ($p < 0.001$). The relationship between DMFT and OHI-S in the total population was statistically significant ($p < 0.01$). DMFT and OHI-S

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were higher in the traditional schools than in HPSs. Conclusion: The oral health condition was better in HPSs than in the traditional schools. Planning to improve and change remained traditional primary schools to HPSs and paying attention to education seem to be essential to promote the oral health of children.

***Keywords*---**DMFT, OHI-S, primary students, dental health, oral health behavior, health-promoting schools.

Introduction

Oral and dental hygiene is one of the most important parts of public health; thus, mouth and face are considered a mirror of health (1, 2). In this way, poor oral and dental health affects the quality of life, resulting in pain, discomfort, loss of teeth, impairment of oral performance, deformities, and even death due to oral cancer (3). Studies have shown that students with poor oral and dental hygiene experience more toothache, absence from school, and decreased performance in school. Therefore, it can be concluded that increasing the level of oral and dental hygiene in children can improve their performance and education in school (4). The number of oral and dental diseases is significant, and dental caries and periodontal diseases are most commonly seen in human populations, affecting more than 80% of students in some countries (5).

Dental caries is one of the most common diseases in childhood. Also, recent studies have shown a positive correlation between oral conditions and some diseases such as heart diseases, diabetes, and low-birth-weight infants (6). Suffering pain due to dental caries and high costs of treatment and their impacts on quality of life are considered an important public health problem in the world, and it has remained an unfavorable condition, especially among socioeconomically disadvantaged populations (3, 7). In some developing countries, dental caries are increasing due to dietary changes, and about 60%-90% of school-age children suffer from dental caries (8). Besides caries, the prevalence of periodontal diseases has been reported in 51%-54% of children under 14 years (9). Schools can have important roles in developing and improving health behaviors in the community. The World Health Organization (WHO) planned a social health promotion program. Then, health-promoting schools (HPSs) were formed and implemented in all countries based on this approach (10). This study evaluated some oral health behaviors on caries and oral hygiene indices. The target group was 12-year-old students in the last grade of primary schools in Hashtgerd City, Iran, Alborz Province.

Materials and Methods

This descriptive, cross-sectional study was conducted on 162 students aged 12 years old in Hashtgerd. The sampling method, a two-step clustering (each school was considered a cluster), was performed after preparing the information form and obtaining the necessary permissions from a list of all primary schools in Hashtgerd. There were 30 primary schools in Hashtgerd City, including 15 girls' schools and 15 boys' schools, which according to the sample size and study time,

ten schools were selected among a list of girls' and boys' schools as 10 clusters by RAND Excel 2010 software. After conducting the necessary coordination, five girls' schools and five boys' schools were enrolled. After coordinating with school officials and explaining the study procedure and purpose, written consent was obtained from all parents. In the second step, 15 sixth-grade students were selected regarding the class list from each school. The study population consisted of at least 150 students in the age group of 12, but 162 subjects were examined to ensure that the required information was obtained. The data collection method was based on observation, interview, and examination. The WHO oral and dental health information form was used in this study. Before the examination, some questions about the students' hygiene behaviors and the frequency of referral to the dental office were asked and recorded. Students were examined by a dentist on a regular chair with a mirror and a disposable dental probe under natural light. Dental caries were assessed according to WHO guidelines (11).

To measure the effect of oral hygiene behaviors, the plaque and oral hygiene index simplified (OHI-S) was selected. OHI-S, presented by Greene and Vermilion, selects six tooth surfaces that represent all the anterior and posterior sections of the mouth based on the total oral examination; the surfaces of the six teeth examined included the facial surfaces of teeth 16, 11, 26, 31 and the lingual surfaces of teeth 36 and 46 (12). This index consists of two parts of the debris index-simplified and calculus index-simplified, each of which is evaluated based on the set of codes from zero to three (13). Each tooth surface was horizontally divided into 1/3 gingival, 1/3 middle, and 1/3 incisal. If the tooth was missing, the adjacent tooth was examined. To determine the amount of debris and calculus, each of these surfaces mentioned was carefully examined, and the extent and amount of the calculus and plaque were examined, determined, and scored by pulling the side surface of the probe on the surface of the tooth examined; then, the obtained figures on six surfaces were summed up, and after dividing by six, the numbers of calculus and plaque were obtained. Also, the sum of two numbers of calculus and plaque was considered as OHI-S. The OHI-S score varies between zero to six, in which 0-1.2 is good, 1.3-3 is moderate, and 3-6 is weak. Data were analyzed using SPSS version 21 using descriptive statistics, the t test, and the Pearson correlation coefficient.

Findings

Students' status based on gender, type of school, and some oral and dental hygiene behaviors (including tooth brushing, dental floss, mouthwash, and dental visit) were analyzed statistically. It was found that about 90% of students brushed their teeth at least once a day. However, about 80% of them did not use dental floss, and more of them did not use mouthwash. Table 1 shows more details.

Table 1
The status of 12-year-old students in Hashtgerd City based on oral and dental hygiene behaviors

Variable name	Classification	Number	Percentage
Gender	Boy	86	53.1
	Girl	76	46.9

Type of school	Traditional	91	56.2
	HPS	71	43.8
Kind of school	Governmental	133	82.1
	Privates	29	17.9
Use of toothbrush	No	19	11.7
	Yes	143	88.3
Number of tooth brushing	Do not brush	55	34
	1	59	36.4
	2	40	24.7
	More than twice a day	8	4.9
Dental visit	Without a visit	44	27.2
	Have come	118	72.8
Use of dental floss	Does not use	128	79
	Uses	34	21
Use of mouthwash	Uses	146	90.1
	Does not use	16	9.9
Oral health instruction	No	31	19.1
	Yes	131	80.9
Using sweet and candy times	0	17	10.5
	1	41	25.3
	2	56	34.6
	3	18	11.1
	4	8	4.9
	5 and more	22	13.5

The mean of the decayed, missing, and filled teeth (DMFT) index in girls was 1.84 and in boys was 1.76, which there was no statistically significant difference between the two genders. The mean debris index in girls and boys was 1.12 and 1.43, while the calculus index was very low (0.05 and 0.16 orderly). OHI-S in girls and boys was 1.18 and 1.59, respectively. More details are given in Table 2. Differences between the two genders showed that there were significant differences in the debris index ($p < .001$), calculus index ($p = .003$), and oral hygiene index ($p < .001$).

Table 2
The mean of indices among 12 years students based on genders

Gender	Boys ($N = 86$)				Girls ($N = 76$)				Sig.
Variables	Min.	Max.	Mean	SD	Min.	Max.	Mean	SD	
DMFT	0	9	1.76	2.075	0	14	1.84	2.281	.801
Debris index	.00	2.33	1.4322	.46819	.17	2.00	1.1250	.45795	.000
Calculus index	.00	1.67	.1628	.29702	.00	.50	.0548	.11018	.003
Oral hygiene index	.00	2.83	1.5950	.56623	.17	2.17	1.1798	.50019	.000

*Sig. between genders

Data analysis also showed that HPSs had a significantly better condition in oral health indices than the traditional schools. All investigated indices, including DMFT, debris, calculus, and oral hygiene indices, were lower in HPSs, while it was significant or near to significant in the DMFT index (p = .005), debris index (p = .086), and oral hygiene index (p = .069). Table 3 shows more details.

Table 3
The mean of indices among 12 years students based on the type of school

	Traditional schools (N = 91)				Health-promoting schools (N = 71)				Sig.
	Min.	Max.	Mean	SD	Min.	Max.	Mean	SD	
DMFT	0	14	2.22	2.417	0	6	1.25	1.662	.005
Debris index	.17	2.33	1.3462	.50199	.00	2.00	1.2136	.45963	.086
Calculus index	.00	1.67	.1264	.25500	.00	.83	.0939	.20651	.384
OHI-S	.17	2.83	1.4725	.56288	.00	2.83	1.3075	.57780	.069

The results also showed that the numbers of healthy teeth and filled teeth (without caries) were higher in HPSs than in the traditional schools. Also, these students had a lower rate of decayed or extracted teeth due to caries than the traditional school students (Table 4).

Table 4
Percentages of different items of DMFT in HPSs and traditional schools in Hashtgerd, Iran

Parts of DMFT (%)		Sound teeth	Decayed teeth (D)	Filled teeth with caries (D)	Filled teeth without caries (F)	Extracted teeth due to caries (M)	Total
Type of schools	TS*	60.4%	28.6%	0.275%	9.075%	1.65%	100%
	HPS**	75.72%	13.73%	0%	9.5%	1.05%	100%

*TS: Traditional school **HPS: Health-promoting school

By performing the bivariate correlation coefficient test between two by two of some variables, such as DMFT, the number of brushing, frequency use of candy, debris index, DMFT of existing primary teeth, and oral hygiene instruction in the studied population, a significant relationship was observed between the DMFT index and each of 1) oral hygiene instruction (p = .092), 2) frequency use of candy (p < .001), and 3) debris index (p = .005). It meant having oral hygiene instruction, less use of candy and lower debris index had significant or near to significant results of the lower DMFT index. It also showed that having oral hygiene instruction could have positive significant or near to significant results on DMFT (p = .092), number of brushing (p = .003), frequency use of candy (p = .013), and debris index (p = .018). Table 5 shows more details, and Figure 1 makes it easier to understand.

Table 5
The bivariate correlation coefficient test between two by two of some variables among 12-year-old students in Hashtgerd, Iran

		DMFT	Number of brushing	Frequency use of candy	Debris index	DMFT of primary teeth	Oral hygiene instruction
DMFT	Pearson correlation Sig. (2-tailed)	1	.055 .486	.317** .000	.218** .005	-.057 .474	-.133 .092
Number of brushing	Pearson Correlation Sig. (2-tailed)	.055 .486	1	-.089 .261	-.187* .017	-.193* .014	.233** .003
Frequency use of candy	Pearson Correlation Sig. (2-tailed)	.317** .000	-.089 .261	1	.212** .007	.044 .574	-.194* .013
Debris index	Pearson Correlation Sig. (2-tailed)	.218** .005	-.187* .017	.212** .007	1	-.015 .854	-.185* .018
dmf of primary teeth	Pearson Correlation Sig. (2-tailed)	-.057 .474	-.193* .014	.044 .574	-.015 .854	1	.085 .282
Oral hygiene instruction	Pearson Correlation Sig. (2-tailed)	-.133 .092	.233** .003	-.194* .013	-.185* .018	.085 .282	1

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

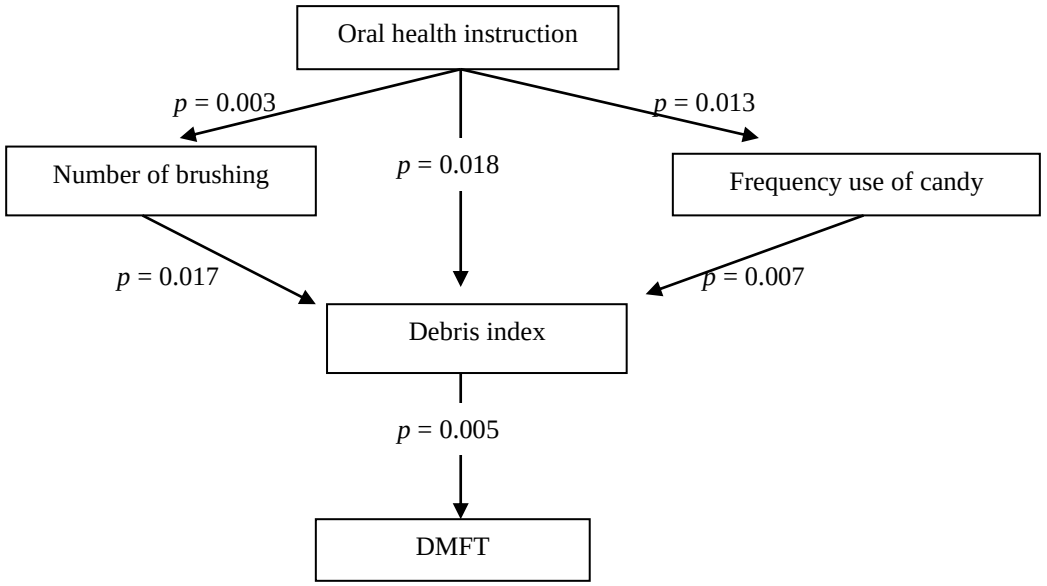

Figure 1. Relation and level of significance between some variables

Discussion

HPS is a health program that continuously strengthens its capacity as a healthy setting for living. All countries are implementing this program in their schools. To remind and plan oral health in these schools, WHO emphasized oral health promotion as an essential element of HPS (14). This study was conducted to evaluate the oral health condition in HPS vs. traditional schools in Hashtgerd City, Iran. As seen in the figure, oral hygiene instruction is the primary factor causing significant changes in the status of oral health behaviors and indicators. Esfahanizadeh (2011), Lai (2016), and Naidu (2017), in their clinical trials, showed its effectiveness (15, 16, and 17). They demonstrated the positive effect of health education on reducing microbial plaque and improving gum health. Health education is the first item expected to do in HPSs. In our study, the oral health indicators were significantly better in HPSs than in traditional schools.

The mean DMFT in the 12-year-old group in our study was 1.83 ± 0.2174. Kim (2012) and Al-Rafee (2018) had the same studies in Korea and Saudi Arabia; they found the mean DMFT = 1.84 and 1.72 (SD ± 0.49), respectively, which is almost consistent with our study (18, 19). The mean of this indicator in our study is lower than Dukic et al.'s study in Zagreb, Croatia (children aged 12; 2011) and Shabani et al. in Kosovo (10- to 15-year-old children; 2015), which the mean DMFT in their studies was 4.8 and 2.61, respectively (20, 21). On the other hand, our mean score in dental caries is higher than the studies by Dixit et al. in Nepal and Engelmann et al. in Brazil (22, 23). The mean DMFT score of 12- to 13-year-old students was 0.84 in the Nepal study and 1.15 in the Brazil study. The reason for these differences, in addition to differences in distribution and sample sizes, can be based on cultural and racial differences, access to dental centers, access to dental services, nutritional habits, and lifestyles.

The mean of OHI-S in the 12-year-old group in our study was 1.40 ± 0.573, which is higher than the mean by Shabani et al. in Kosovo (19). Given that socioeconomic and cultural factors are effective in oral and dental hygiene, the difference in these factors in different communities can lead to a difference in OHI-S levels. In our study, there was no correlation between DMFT and genders (p = 0.897), which is consistent with the studies by Dukic et al. and Shabani et al., with no relationship between DMFT and genders was found (20, 21). However, in the studies of Sharma et al. and Seth et al. in India and Oliveira et al. in Brazil, the DMFT index was higher in girls (24, 25, 26), which could be due to the difference in the earlier eruption of permanent teeth in girls, which causes girls' teeth to be more exposed to decay (27).

According to the results of this study, there was a significant relationship between the OHI-S and genders (p < 0.001), showing that girls' health levels were better than boys, which the studies of Seth et al. confirm this result (28). Higher OHI-S in boys is mainly behavioral differences and low attention to oral hygiene compared with girls and paying more attention to girls in families. Meanwhile, in Sharma et al. and Fallahnejad et al. studies, no significant relationship was found between OHI-S and genders (24, 29). In this study, the association between DMFT and OHI-S indices in the 12-year-old group was statistically significant (p < 0.01). In the 12-year-old group, all permanent teeth are usually grown apart from the

third molar, and the DMFT index is more accurate. As a result, its relationship with OHI-S in this age could be more significant. In the present study, the relationship between these two indices was statistically significant (p = 0.005), consistent with Shabani et al. (21), showing that when one index increases, so do the other.

Conclusion

HPSs had better oral health based on their programs on improving general and oral health behavior. It seems necessary to develop and change traditional schools to HPSs. It also needs to do things such as education, prevention, and treatment to improve children's oral and dental health in Hashtgerd City.

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