DMFT in Iranian 12-Year-Old Students Residing in the Desert Region and Its Association with their Individual and Family Factors

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Abstract

Background: Oral health and associated factors in students, as an important health-related subject, would be effective on their growth, self-confidence, socialization, learning ability, daily activities, and quality of life. The aim of this study was to evaluate the DMFT index of 12-year-old students in Gonabad, Bajistan and its relation with their personal and family factors.

Materials and methods: An analytic-cross sectional study conducted among 1280 the students residing in the two desert districts of Iran in 2016. The required data including the subjects' demographic and family factors as well as their oral health situation extracted from The National School Oral Health Program. A Kruskal Wallis, Mann-Whitney, and logistic regression model use to analyze the risk factors that may be associated with DMFT index.

Results: Mean (SD) of the students' DMFT was 1.47 (1.82). This index was calculated 0.98 (1.47) for boy students and 1.91 (1.98) for girl students (P<0.001). There were significant association between mean of the students' DMFT and their residency location (P=0.015), birth rank (P=0.032), and level of education of their mothers (P=0.035).

Conclusion: According to the findings, attention to oral health in students, especially in girls, seems necessary. Increasing the knowledge and sensitivity of parents (especially mothers) concerning oral health of their children, especially their girls, the use of intermediate forces such healthcare providers in school and oral health technicians in health centers, and the implementation of preventive interventions such as fissure sealant, fluoride varnish therapy, and use of sodium fluoride mouthwash by students would be effective for improving the oral health of students.

Key Words: DMFT, Oral health, quality, mouthwash, Dental.

Abbreviations

DMFT: Decayed, Missing, and Filled Teeth; WHO: World Health Organization; SD: Standard Deviation.

Introduction

Oral Health is an important and necessitate part of public health which affects individuals' quality of life. This is more important in children, because it leads to various complications such as dental pain, problems in speaking, general disorders, and psychological problems. It influences on their growth, weight, self-confidence, socialization, daily activity, and ability to learning [1-3]. The World Health Organization (WHO) has also identified dental caries as a health problem with a prevalence of 60 to 90 percent among children [4]. The high prevalence of dental caries has not only negative effects on quality of life of children and their parents [5], but also imposes heavy costs on health systems in countries [6]. Although the oral health situation has recently improved in the world, dental caries is still one of the most important public health problems even in industrialized countries where preventive programs are not well established or well implemented [7, 8]. In US, for instance, prevalence of dental caries is five times higher than asthma and seven times higher than seasonal allergies [9]. One of the important age groups for evaluating the oral health, which is also affirmed by the WHO, is the age group of 12; because in most countries nearly all the 12-year children are in school, and most of their permanent teeth are likely to develop [10].

The most important indicator used to assess oral health status is DMFT (permanent Decay, Missing, Filling Tooth) [11]. According to studies conducted in Iran, the DMFT in all Iranian children and in 12-year children was 2.30 and 1.84, respectively [8,12].

Various studies have found that many factors such as Socio-Economic Status (SES), parents' education level and occupation, sex, and birth rank would affect the children's oral health status [9,13]. There are also some studies that, in desert areas, show the DMFT among children is roughly high [14-18]; Therefore, since Iran is still considered as a young country [19], planning and implementing to prevent and treat oral diseases would be necessary.

The first step seems to be the implementation of studies and the comprehensive evaluations of oral health indicators and the factors affecting it on a national and regional level, which can play an important role both to design of interventions and to prevent and treat illnesses associated with oral and dental problems [7, 20]. Meanwhile, Gonabad and Bajestan are two desert cities locating in Eastern part of Iran. The results of some studies in similar climate zones in Iran show a high DMFT index in these areas [14], although other studies in tropical and desert regions have reported different results [21,22]. So, according to the above mentioned issues as well as the importance of regional studies to recognize the oral health status and, if necessary, design and implement intervention programs appropriate to the regional conditions, this study aims to examine the DMFT in 12-year-old students of Gonabad and Bajestan and determine some of their affecting factors.

Materials and Methods

This analytic, cross-sectional study was conducted among 1280 the 12-year-old students in Gonabad and Bajestan in 2016. The target population was all primary school students in Gonabad and Bajestan and required data were collected from the National Oral Health Program of Students which was implemented by Deputy for Health of Gonabad University of Medical Sciences

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and was supervised by the Iran's Ministry of Health and Medical Education Although This study was carried out after the approval of the ethics committee and the research council of Gonabad University of Medical Sciences and an informed consent form was received from the parents of the students. In this national plan, all elementary students were examined by dentists working in the health centers and their data were entered into a checklist by the dentist. The checklist includes data about the student's characteristics (name, sex, date of birth, birth rank, and father's name), his/her family-social characteristics (place of residence, parent's age, job, and level of education, birth rank, number of siblings), and oral health condition of the respondents (using toothbrush, dental floss, and sodium fluoride mouthwash). In this study, the diagnosis of dental caries was performed by the dentists using a catheter and a mirror of the dental bed and natural light by observation and then touching the catheter. The data obtained from the examination were then recorded in the checklist for each student. The collected data were entered into SPSS (Version 20(. Comparing the groups, we used Mann-Whitney and Kruskal-Wallis tests. Univariate and multiple logistic regression model was used to determine the simultaneous effects of the variables on DMFT. In all the tests, a significant level of 0.05 was considered.

Results

The study included 1,280 12-year-old students from Gonabad and Bajestan, of whom 601 (46.9%) were boys. The mean and standard deviation of the total DMFT index in this study was 1.47 ± 1.82. The mean and standard deviation of the DMFT index in boys was (0.98 ± 1.47) and lower than in girls (1.91 ± 1.98). The results of this study showed that most of the students lived in the Urban (74.6%) and most of them (95.2%) had one type of insurance. Also, most of students did not use fluoridated mouthwash (83.6%) and dental floss (74.8%), and most of their Father's occupation and Mother's occupation were Self-employed and workers (70%) and Homemaker (81.1%), respectively (Table 1). The results of Mann Whitney and Kruskal Wallis tests showed There is a significant relationship between DMFT index and gender (P-Value>0.001), Place of residence (P-Value=0.015), Mother's education (P=0.035) and birth rank (P-Value=0.032) (Table 1).

Table 1: *DMFT assessment in 12-year-old students.*

P-Value	Median (IQR)$	Mean ± SD	Mean Rank	N (%)	Variables	
<0.001	0 (2)	0.98 ± 1.47	543.64	601(47)	Boy	Gender*
	0 (3)	1.95 ± 1.84	726.23	679(53)	Girl	
0.015	1(2)	1.50 ± 1.82	652.39	952(74.6)	Urban	Place of residence*
	0 (2)	1.29 ± 1.71	597.68	324(25.4)	Rural	
0.902	1 (2)	1.45 ± 1.81	640.77	1218(95.2)	Yes	Insurance*
	1 (2)	1.38 ± 1.47	635.18	62(4.8)	No	
0.954	1 (2)	1.27 ± 1.38	638.77	15(1.2)	Unemployed	Father's occupation#
	1 (3)	1.57 ± 1.94	645.45	53(4.2)	Retired	
	1 (2)	1.47 ± 1.81	632.48	881(70)	Self-employed and worker	
	1 (2)	1.44 ± 1.83	621.95	311(24.6)	Employee	
0.341	1 (2)	1.43 ± 1.78	631.03	1031(81.1)	Homemaker	Mother's occupation#
	1 (2)	1.56 ± 1.97	642.84	171(13.4)	Employee	
	2 (3)	1.72 ± 1.81	693.28	69(5.5)	Other	
0.055	1 (2)	1.30 ± 1.73	665.38	301(24)	Primary school education	Father's education#
	1 (3)	1.54 ± 1.80	650.08	651(51.8)	Middle and high school education	
	1 (2)	1.38 ± 1.84	614.54	304(24.2)	University education	
0.035	0.5 (2)	1.26 ± 1.69	593.06	370(29.3)	Primary school education	Mother's education#
	1 (2)	1.49 ± 1.76	646.15	635(50.3)	Middle and high school education	
	1 (3)	1.58 ± 1.99	653.02	258(20.4)	University education	
0.187	1 (3)	1.65 ± 2.00	639.35	201(16.4)	Yes	Use fluoridated Mouthwash*
	1 (2)	1.41 ± 1.75	605.41	1020(83.6)	No	
0.292	1 (3)	1.55 ± 1.82	629.35	308(25.2)	Yes	Use dental floss*
	1 (2)	1.41 ± 1.79	606.16	915(74.8)	No	
0.611	1 (2)	1.46 ± 1.81	627.27	1107(88.5)	Yes	Brush teeth regularly*
	1 (2)	1.35 ± 1.64	611.82	143(11.5)	No	
0.032	1 (2)	1.40 ± 1.75	629.76	1152(90.5)	01-Mar	Birth rank*
	1 (3)	1.89 ± 2.07	701.19	120(9.5)	4 or more	

#Kruskal Wallis statistical test
*Mann-Whitney statistical test
$interquartile range

Table 2: *Relationship between DMFT of 12 year-old students and selected variables in the Univariate and Multiple logistic regression models.*

Multiple				**Univariate**				
P-Value	95 % C.I.	Odds ratio	Regression coefficient	P-Value	95 % C.I.	Odds ratio	Regression coefficient	Variables
								Gender
								Boy[a]
0.001>	2.13-3.39	2.69	0.99	0.001>	2.06-3.23	2.58	0.94	Girl
----	----	----	----	0.949	0.98-1.01	1	0.001	**Father's age**
----	----	----	----	0.555	0.98-1.02	1	0.006	**Mother's age**
								Birth rank
								1-3[a]
0.002	1.27-2.94	1.93	0.66	0.06	0.98-2.13	1.45	0.37	4 or more
								Insurance
----	----	----	----					No[a]
----	----	----	----	0.718	0.54-1.52	0.9	-0.09	Yes
								Father's occupation
----	----	----	----					Unemployed[a]
----	----	----	----	0.352	0.20-1.76	0.59	0.51-	Retired
----	----	----	----	0.486	0.19-2.17	0.65	0.42-	Self-employed and worker
----	----	----	----	0.266	0.17-1.60	0.53	-0.62	Employee
								Mother's occupation
----	----	----	----					Homemaker[a]
----	----	----	----	0.893	0.73-1.41	1.02	0.02	Employee
----	----	----	----	0.257	0.81-2.19	1.33	0.28	Other
								Place of residence
								Rural[a]
0.005	1.12-1.96	1.48	0.39	0.004	1.12-1.86	1.44	0.36	Urban
								Father's education
								Primary school educationa
0.901	0.71-1.35	0.98	-0.02	0.084	0.96-1.67	1.27	0.24	Middle and high school education
0.049	0.43-0.99	0.66	-0.41	0.905	0.74-1.40	1.02	0.02	University education
								Mother's education
								Primary school educationa
0.011	1.09-2.03	1.49	0.4	0.047	1.00-1.67	1.29	0.26	Middle and high school education
0.02	1.08-2.47	1.63	0.49	0.11	0.94-1.78	1.29	0.26	University education
								Brush teeth regularly
----	----	----	----					Yes[a]
----	----	----	----	0.618	0.64-1.29	0.91	-0.08	No
								Use fluoridated Mouthwash
----	----	----	----					Yes[a]
----	----	----	----	0.366	0.64-1.17	0.86	-0.14	No
								Use dental floss
----	----	----	----					Yes[a]
----	----	----	----	0.445	0.69-1.17	0.9	-0.1	No

[a]Reference category

In this study, using logistic regression, the relationship between children's 12-year-old DMFT index and variables in the study (gender, father's age, mother's age, birth rank, insurance, father's occupation, mother's occupation, place of residence, father's education, mother's education, brush teeth regularly, fluoridated mouthwash and flossing) were examined. First, the mentioned variables were entered in the univariate model, and each of them, which p-value was less than 0.2 (p-value<0.2), entered the multiple model. In the multiple model, gender variable with an odds ratio (2.69), birth rank with an odds ratio (1.93), place of residence with odds ratio (1.48), Middle and high school education of mother with an odds ratio (1.49) mother's university education with an odds ratio (1.63) and father's university education with an odds ratio (0.66) had a statistically significant relationship with the DMFT index of 12-year-old children (Table 2).

Discussion

This study conducted to determine the status of DMFT among 12-year-old students in Gonabad and Bajnestan, two desert districts and its association with their individual and family characteristics in 2016. The total mean (SD) of the students' DMFT was 1.47 ± 1.82 (in boys and girls 0.98 ± 1.47 and 1.91 ± 1.98, respectively). Also, based on the results of multiple logistic regression analysis, DMFT index had a significant relationship with the subjects' sex, parents' education, birth rank, and place of residence, but not with dental health behaviors of the students.

In our study, the students' DMFT was 1.47 which was less than in Iran, as a whole (1.84) as well as in Khorasan Razavi province (1.71), based on the latest national oral and dental health survey [10]. This was also less than some similar studies in Iran [23,24], Saudi Arabia [25], Eritrea [22], Korea [26], and Libya [27]; while more than that of some studies in India, China and Sudan [7,21,28]. This discrepancies in various studies conducted in different geographical areas with different climate situations indicate that oral and dental health, rather than being affected by climate condition, are more affected by factors such as cultural, racial, access to dental services, nutritional habits, lifestyle, and the students' status of education for dental health and providing preventive dental health services to them [22,29,30].

There was statistically significant difference between DMFT of the girls and boys in our study; so that the odds of caries in the girls were 2.69 times of the boys. This was consistent with the results of Zhang et al. [31] and Huew et al. [27] Yousefi et al. [32] and Gorgi et al. [13]; but not to the results of study by Al-Akwa et al. [3] and Andegiorgish et al. [22] and Toomarian et al. [33]. The high DMFT index in girls may be due to the earlier onset of permanent teeth, which makes their teeth longer exposed to rot; though, this measure, probably in the long run, become equivalent in both sexes [22,25].

The results of this study showed that there is a significant association between the students' DMFT and their residency location which means the students living in urban areas had higher odds of caries than those in rural areas (OR=1.48). This is comparable with the results of d Al-Akwa et al. studies [3], while our result is not similar to Giacaman et al. [34] study results. One of the potential explanation for this difference is that the urban students have probably more access to sugary foods and beverages, snacks (i.e. puff and chips), and fast food than rural students [3]. These edibles could increase the risk of dental caries. Differences in Fluoride drinking water between urban and rural areas could be another reason for this discrepancy. Besides, because of lower student population in rural areas, better implementation of and more success in dental health programs such as using sodium fluoride mouthwash by students, varnish Fluoride therapy and fissure Sealant for Students would be a potential outcome. Although more studies need to evaluate this probability.

Our results showed that there is a significant relationship between the students' DMFT and their mother level of education, which means that with the increase of mothers' education, the chance of dental caries in students is higher. Although the results of many studies in many countries such as Iran [35-37], China [38], and Greece [39] are not similar to our findings, some studies have not reported a meaningful statistical relationship between parents' education and dental caries of their children [40,41]. Even a Norwegian study showed that the chances of dental decay in children with one or both parents with low level of education are two and three times higher than children who have parents with high education level, respectively [42]. Possible reasons for the difference in outcome may be due to differences in the age of the subjects, consideration of the parents' employment status, cultural and socioeconomic status of the children, and statistical methods used in various studies.

In our study, there was a direct association between the subjects' DMFT and their birth rank. Indeed, the odds of dental caries of the students increased with their birth ranks. This was comparable with other studies [43,44]. This result is due to the fact that the increase in the number of children in the family is likely to reduce the parental attention of children. In addition, the number of children increase, the household expense increase; therefore, the possibility of receiving dental health care for children decrease and, subsequently, the probability of their dental caries increase [44].

In our study, there was no significant association between the students' DMFT and their oral hygiene behavior such as using dental floss and brushing. Besides, there was no meaningful relationship between DMFT and using sodium fluoride mouthwash by the students. Our findings are similar to the results of QUAN and colleagues [38] in China, but inconsistent with Al-Akwa et al study results [3]. It seems quality of dental floss use and brushing plays an important role in the prevention of dental caries. Meanwhile, the results of various studies have shown that the presence of standard fluoride in drinking water [3], as well as in mouthwashes and toothpastes, would be one of the effective factors on reducing dental decay [45,46]. Therefore, since the fluoride is not added to drinking water in Iran, use of sodium fluoride mouthwash and fluoride-containing toothpastes, if used correctly and adequately, is recommended as routine intervention to reduce tooth decay.

There is some strength in our study. Determining the oral health status by the dentist, using country program data, and entering the entire target population are some of the strengths of the study. One of the potential limitations is the use of more than one dentist in the Oral Health Program of Gonabad and Bajestan Students. This may have led to an inaccuracy of the gathered data due to inter-personal variation. To control this concern, all dentists were initially trained on how to implement the national plan, and they used the same checklist during the implementation of the plan. Moreover, the required data were extracted from the checklists used in the national program for oral health; so, the probability of inaccuracy in completing them would be another limitation of the present study.

Conclusion

The results of the current study showed an association between DMFT of the 12-year-old students and their sex, birth rate,

parents' education and place of residence. Although the DMFT in Gonabad and bajestan, in comparison with national target, would be acceptable, this is far from the goal announced by WHO for 2015 (DMFT one or below). To meet the goal, it seems applying qualified and timely preventive dental health interventions including students' mouthwash program, fissure sealant, and varnish fluoride therapy would probably be helpful. Improving the level of people's health literacy through considering the oral health course to better educate students and strengthening the performance of school health educators to sensitize the students and their parents to use the above preventive programs could also be considered as other effective methods for promoting student's oral health.

Declarations

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Author Contributions Statement

Contributions: research idea and study design: S.E., A.A, A.J, A.R, statistical analysis and write the first draft of the manuscript: S.E., A.A, and A.J, helped as a consultant on the study design: A.R, S.E, A.A, critically and substantially revised the final article: S.E., A.A, A.J, A.R. All authors read and approved the final manuscript

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Availability of data and materials

Data is available by the corresponding author on reasonable request.

Ethics approval and consent to participate

Ethical approval was received for this study from the Ethics Committee of the Gonabad University of Medicine Sciences (IR.GMU.REC.1394.100).Written informed consent was obtained from parent/guardian of students participated in this study.

Consent for publication

Not applicable.

Competing Interests

The authors declare no conflict of interest

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