

IDENTIFYING AND INVESTIGATING THE CAUSES OF THE PREVALENCE OF NOTABLE CARIES AND ORAL AND DENTAL HEALTH INDICATORS AMONG STUDENTS UNDER 14 YEARS OF AGE IN TEHRAN PROVINCE

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ABSTRACT

Aim: The World Health Organization and World Dental Federation have considered the prevalence of Decay Missing Filling Teeth (DMFT) at the age of 14 as a maximum of 1 as a part of the goals of oral health for all in 2016. The purpose of this study was to identify the status and evaluate the oral health in 14 years old adolescents using DMFT index in Tehran province in 2016 and 2017.

Materials & Method: This study is an observational, descriptive and applied study that was conducted in a cross-sectional fashion. For this purpose, 300 school children in the dual education districts of Tehran in 2016 and 195 students in 2017 were randomly selected. Examination were performed and data were recorded in special forms, and at the end, these data were compared by T-test method for statistical analysis.

Results: The mean DMFT of 5.2 ± 4.12 obtained for 14 years old adolescents in Tehran's schools. 12.5% of all adolescents (34 people) were caries free. The percentage of adolescents who had DMFT > 10 made up 5.5% of the total population. There were 7.21% extracted teeth and 78.2% decayed teeth. Also, the ratio of restored teeth to total DMFT is 16.72. 95.04% of subjects had all their teeth in their mouths, which is slightly higher than the WHO goals in 2000 (87%).

Conclusion: According to the results of this study, it seems that therapeutic and preventive dental services in Tehran province are far from optimal. Therefore, the results of this study can be used for principled planning of prevention and treatment used by health practitioners.

Key words: Dental health, DMFT (Decay-Missing-Filling-Teeth), Oral and dental hygiene, Prevention.

Introduction

Advancement and development in different societies economically and socially depend on the intellectual health of the people of that community. Intellectual health or correct thinking in turn arises from physical health. DMFT index is one of the most important indicators in the field of oral and dental hygiene status of community members, because according to it, in addition to determining the amount of decay and types of treatments used in the past, we can determine the current therapeutic needs. Since dental caries and periodontal diseases are one of the common diseases of the oral cavity, they can have a great effect on the performance and economic efficiency of the community. Today, in all developed countries, attention to health and prevention is prior to treatment, and most of the activities are done to eliminate the causes of the disease rather than the complications of the disease. The requirement for performing prevention programs is to have a full knowledge about facilities and potential conditions of the community. This information should be properly obtained from the community and be analyzed, and its results would be used. This is possible only through epidemiological studies.¹ World Health Organization (WHO) and World Dental Federation (FDI) hoped that by 2000 all nations of the world improve their oral and dental health status. The overall objectives of these two organizations include the following six general goals:

- **First goal:** 50% of children aged 6 to 5 years would be caries free.

- **Second goal:** Evaluation of the prevalence of decay (DMFT) in 12 years old children should not be more than 3.
- **Third goal:** 85% of 18-year-old youths have not lost any of their teeth.
- **Fourth goal:** Edentulous would be reduced by 50% in the age group of 44-35 years.
- **Fifth goal:** Edentulous would be reduced by 25% in people aged 65 and over.
- **Sixth goal:** Creating a basic information system to assess the changes in oral hygiene in different societies of the world.²

Today, DMFT index is used in epidemiological studies of dental caries. This is a valid and reliable index, and in general, it is an irreversible index. Because it is a sign of experiencing decay in a person's life (dental caries cannot be self-repairable), in contrast, the gum index is a reversible index, and may change and reduced from time to time in a person, which is the result of a person's recovery from gum disease.³

The DMFT index was introduced by Kleni Pulmero Knutson in 1938.⁴

The researchers used this index to conduct their epidemiological research in Maryland. In fact, the ratio of the number of decayed teeth in 100 children was examined for the first time in 1930 by Dean.⁵

In the DMFT index, the letter D indicates the number of decays, M indicates the number of missing teeth and F indicates the number of filled teeth in each tooth (T).

The amount of MF and F can individually indicate the type of treatments that are performed in a community, and therefore, more information is obtained from DMFT index. For example, in two different societies with the same DMFT, we can identify the existence or absence of healthcare in the community by comparing D, M and F separately.

By comparing D, M and F in different ages we can see the access of any age group to the type of health care at any age in a community.

Lahimchi and Golpayegani in a study, titled "Oral and dental status of 14-year-old adolescents in Babel city", examined 200 adolescents, in which a DMFT of 4.65 was obtained.⁶ In a study by Okeigbemen (2004) conducted on 358 students aged 12-14 years, the DMFT index in the age group of 14 years was 0.66, and 98.6% of this index was related to the decayed teeth group, meanwhile 67% of these people were caries free.⁷ In a study by Adewakan (2005) on 711 students in Trinidad, the DMFT of 2.66 was reported at the age of 14 years, and 50% of first permanent molar teeth were decayed and restoration index of teeth was only 0.20. Meanwhile, the parents of students with university education had the least DMFT compared to others.⁸

Motohashi *et al.* (2006) conducted a study to evaluate the DMFT index for predicting the decay of permanent teeth in Japanese girls. The subjects included two age groups in elementary school girls. The cohort I included 45 girls born in 1981 to 1982 and cohort II included 53 girls born in 1990 to 1998. In both cohorts, there was a significant relationship between DMFT in first grade primary school children and DMFT in sixth grade primary school children. In the cohort II, sensitivity and specificity for the cut off stage (DMFT 5.7) were 0.519 and 0.923, respectively, and in the cohort I, sensitivity and specificity were 0.741 and 0.721, respectively. In both cohorts, the degree of decay of permanent teeth at different levels of DMFT from cut off was significant. The results show that the DMFT index is a useful predictor.⁹ In our country, there is not much research on the DMFT index at the age of 14. The aim of these studies with a 7-year time interval were to evaluate the DMFT status in students in Tehran province and to compare its changes with goals set by the World Health Organization.

Materials & Method

This study was conducted as cross-sectional descriptive study by using observation, interview techniques and the information form. After statistical counseling and considering the 95% confidence level and 0.3% error rate, the sample size was determined as 300 people and with a mean age of 14 years \pm 6 months, and subjects were randomly selected from boys' schools in dual

districts of Tehran province and studied in 2016. This study was also conducted on 195 students in 2017. The distribution of schools was in such a way that 3 schools were randomly selected from each district. In this study, the diagnosis of decay was done using a probe and a flat dental mirror under natural light with observation and palpation method and after drying of each tooth with a sterile gauze, students were examined by visiting the schools and settling in a room with enough light, which is one of the methods proposed by WHO that is done by 4 individuals. The collected data were analyzed using SPSS software and T-test.

Results

The mean and standard deviation of DMFT for all the adolescent boys in this study are shown in Table 1.

Number	Average	Standard Deviation
300	5.2	4.12

Table 1. Mean and standard deviation of DMFT index for adolescents aged 14 years in the study population in Tehran schools in 2016.

The total number of students whose DMFT was zero or in fact they were caries free is 34 people (11.5%). Also, 14.2% of all of adolescents studied only had one or two decayed, restored or extracted teeth due to decay (DMF = 2 or DMFT = 1) [Table 2 and Table 3]

	Number	SD	X	Total
D	300	2.87	3.72	1098
M	300	0.92	0.33	98
F	300	1.67	0.75	220

Table 2. Distribution of mean and standard deviation of DMF index separated by them in students in 2016.

In this study, there was a total of 1,112 decayed teeth, of which the average number of people requiring one-surface restorations is 3.7 ± 2.1 , and the average number of adolescents whose decayed teeth needed a two-surface restoration was 2.5 ± 1.6 . The decay in 41 teeth was so developed that they needed root canal treatment and this was calculated with a mean and standard deviation of 1.57 ± 1.02 . Meanwhile, the extent of decay of 3 adolescents was so high that there was no way but to extract them. Also, the mean and standard deviation of total DMFT in the study population in 2017 obtained as 3.1 ± 3.3 . [Table 4]

	Number	Percent
DMF = 0	34	11.5
DMF = 1	16	5.4
DMF = 2	26	8.8
DMF = 3	23	7.8
DMF = 4	42	14.2
DMF = 5	36	12.2
DMF = 6	33	11.2
DMF = 7	39	9.8
DMF = 8	21	7.1
DMF = 9	14	5.1
DMF = 10	7	2.4
DMF > 10	13	4.4

Table 3. The Frequency of different values and percentage of DMFT in the study population in 2016.

Number	Average	Standard Deviation
195	4.2	1.23

Table 4. The mean and standard deviation of DMFT index for 14-year-old adolescents in the study population in Tehran schools in 2017.

The percentage of total subjects free of caries in this study was calculated as 37.1%. in this study, 24.5% of subjects (89 cases) had DMFT=1, 18.1% had DMFT=2 and 0.3% (1 case) had DMFT=9. In boys, out of the total DMFT, 80.6% were related to unrestored decayed teeth, 5.97% were related to missing teeth due to caries, and 13.43% were related to restored decayed teeth (Table 5 and 6).

The results of this study showed that the highest rate of decay (41.1%) was related to lateral (156 cases), of which mandible lateral was 25% and maxillary lateral was 16.1%. Of total 72 restored teeth, 31 cases (8.2%) were related to first permanent molars, of which 5.8% were related to upper first permanent molars, which can be due to earlier eruption of these teeth. Also, of the total 44 missing teeth due to caries in this study, 1 case was related to mandibular first permanent molars. In this study, of total teeth studied, 950 cases (9.3%) were related to unerupted permanent teeth, out of which 698 cases were related to second molar (407 maxillary second molars, 291 mandibular second molars), 108 cases of second premolars, 84 cases of first premolar

and 60 cases were related to canines. Of the 9,241 teeth tested in this study, 988 cases (7.4%) of primary teeth were existed in mouth of subjects.

Based on the study conducted in the study population, the proposed treatments were determined as follows: Of the total decayed teeth, 310 of them required one-surface restoration treatment, 35 cases required two-surface restoration and 16 cases needed crown in addition to pulp therapy.

Discussion

In this study, the average DMFT of 14-year-old adolescents in Tehran's schools in 2016 was obtained as 5.2 with a standard deviation of 4.12 (5.2 ± 4.12).

The number of adolescents who had DMFT=0, in other words were caries free, included 11.5% of the examined subjects, which this value was 67% in the study by Okeigbemen,⁷ this value is greater than Jeddah of Saudi Arabia with DMFT=4.2, the city of Mecca with DMFT=5.1 and city of Rabigh with DMFT=2 (10). It is higher than 14-year-old African adolescents with DMFT=2.¹¹ This index in Trinidad in 2005 was 2.66,⁸ and in the study in 2004 in Nigeria was 0.66,⁷ in the studies in 2002 in Cattack city was 2.38,¹² and in the study in 2004 in Dir city was 1.8,¹³ indicating that this index is higher in the present study, but compared to adolescents in Ljuljana city (DFT=9), as well as Slovenia city of Yugoslavia (DMFT=10.2), the recent study shows a much lower rate.¹⁴ Held (1967) examined 80 14-year-old adolescents in Tehran and obtained a DMFT=4.8, which is equal to the recent study. In his study, he obtained DMFT=5.4 for 81 people in Isfahan, DMFT=5.3 for 113 people in Shiraz and DMFT=6.1 for 80 adolescents in Tehran, which, in comparison to the recent study, all have many differences.¹²

Considering that DMFT is a special index for comparing the prevalence of dental caries in different societies, thus considering each of D, M and F components separately is necessary to compare the therapeutic status in study populations. For this reason, the discussion about the triple components of DMF is presented below.

Of total DMFT, 77.5% of it were related to decayed teeth (D) and 6.92% were related to extracted teeth (M) and 15.53 were related to restored teeth (F). These figures indicate that dental care should be more widespread so that all community groups can benefit from it. It should be noted that the index of decayed teeth (D) was also very different from the course of studies, so that in study by Adewakun *et al.* it was reported as 50%,⁸ in the study by Okeigbemen as 98.6%⁷ and in the study by Dash *et al.* as 64.3%.¹² The results of this study also show that the percentage of cases without decay is 37.1%, which shows an increase

compared to the percentage of cases without decay in 2016 which was 11.5%, the reason for this difference can be due to differences in culture and

The Amount of DMF	Healthy		1		2		3		4		5		6		7		8		9	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
D Upper Arch	-	-	225	59.2	43	11.3	61	16.1	10	2.6	34	8.9	3	0.5	2	0.5	1	0.3	1	0.3
M Upper Arch	-	-	362	95.3	12	3.2	6	1.6	-	-	-	-	-	-	-	-	-	-	-	-
F Upper Arch	-	-	352	92.6	14	3.9	9	2.4	3	0.8	1	0.3	-	-	-	-	-	-	-	-
D Lower Arch	160	42.1	51	13.4	95	25.0	17	4.5	44	11.6	9	2.4	4	1.1	-	-	-	-	-	-
M Lower Arch	354	93.2	16	4.3	9	2.4	-	-	1	0.3	-	-	-	-	-	-	-	-	-	-
F Lower Arch	335	88.2	17	4.5	22	5.8	6	1.6	-	-	-	-	-	-	-	-	-	-	-	-

Table 5: Comparison of number and amount of DMFT separated by D, M and F with healthy teeth in maxilla and mandible for 14-year-old students in 2017.

2016			2017			p-Value
Number	SD	Average	Number	SD	Average	
300	3.13	4.8	195	3.3	3.1	p<0.001

Table 6: Comparison of the mean DMFT of 14-year-old boys in 2016 and 2017.

awareness of students in these two periods, as well as the difference in the number of samples and also preventive education given by school health educators for increasing the level of dental and oral hygiene of students. Another reason which cannot be ignored is the increase of the awareness of children and their families about the role of diet in oral and dental health, as well as the role of dentist in development of prevention programs for oral and dental diseases. It should be noted that the percentage of caries free cases in the present study can indicate a low mean DMFT in the study population, although it is still far from reaching WHO goals for 2016 (caries free = 50%).²

According to Tables, of total DMFT, 98.8% were related to decayed teeth, 12.5% related to extracted teeth and 20.05% were related to restored teeth, although the percentage of restored teeth in this study (20.05%) is significant in comparison to other studies, but the high percentage of decayed teeth (98.7%) indicate that these teeth had not been treated, which is an important factor in the transmission of caries to healthy teeth and increasing of DMFT levels in later years.

In relation to DMFT obtained in this study and comparing it with other studies, it can be concluded that decay rate in the study population is almost low, but this is not accurate because in this age (14 years), most of the permanent teeth are newly grown and have not been in the mouth for a long time, therefore, they are less exposed to cariogenic factors.

DMFT obtained in this study (3.1%) compared to DMFT (7.37) of 6-year-old children in the study by

Imanian (1998-1999) in Tehran province, it can not necessarily imply the improved level of community health, because at the age of 6 most teeth are decayed, extracted or filled, which itself increases the DMFT.¹⁴

The 95.2% figure obtained for 14 year-year-old age group, which is a very sensitive group among 12 to 18-years-olds, indicates a good status that maintaining it by the community health authorities in the next 3 years in order to comply with the global health standard is very important.

In general, the results of this study on DT show the highest percentage of decayed teeth without treatment, which indicates a low level of dental care provided to this age group in the province of Tehran. The three main factors, including the lack of knowledge of caries and its dangers, the lack of healthcare at school level and heavy costs are among the factors that reduce the willingness for treatment. It should be noted that in the society in which we live, until a disease poses significant problems for the person, few people desire to be treated. However, the comparison of DMFT in the studied years indicates that the DMF index among 14-year-olds in Tehran has been declining, which could be due to increased health awareness of families over the past seven years, as well as the development of health centers and specialized centers in the city and also health advices in schools.

Conclusion

Undoubtedly, the promotion of the culture of soul and body health is significant and important in advancing the health aspirations, especially oral and dental hygiene. Therefore, the use of decay stopping treatments such as fissure sealant and fluoride therapy in permanent teeth is recommended. Also, due to being far from the DMFT index of the World Health Organization, the need for the use of prevention programs in lower age groups is also felt.

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