Original Article

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# Dental Caries Experience in 13–19-year-old Iranian Students Expressed by DMFT and Significant Caries Index

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## ABSTRACT

**Statement of the Problems:** Assessment of tooth caries rate, especially in high-risk portion of the society, is important in order to plan appropriate preventive protocols.

**Purpose**: The aim of the present study was to determine dental caries prevalence in 13–19-year-old Iranian students using two different caries indicators, including DMFT and SiC index.

**Materials and Methods**: A total of 398 students, including 196 boys and 202 girls, participated in the present study; the subjects were selected through stratified cluster sampling method. For each student, decayed (D), missing (M), and filled teeth were detected and DMFT was calculated. After calculating DMFT, the participants were sorted according to their DMFT values. The mean DMFT of one-third of the participants with the highest DMFT values was considered SiC (Significant Caries) index. Independent t-test and one-way ANOVA were used to analysis data with SPSS 13.

**Results**: Mean DMFT values and SiC indexes of all the participants were 3.35±2.22 and 6.62±1.92, respectively. Mean DMFT values in relation to age were as follows: 13-16-year olds: 3.04±2.49; 16–19-year-olds: 3.66±2.95. The mean DMFT was 3.56±2.58 for boys and 3.15±2.63 for girls. According to the sex, SiC index was 6.11±1.98 for girls and 7.11±1.73 for boys; however, Sic index of 13–16- and 16–19-year-old students were 5.88±1.78 and 7.32±1.81, respectively.

**Conclusion**: Age, fluoride therapy, tooth brushing, parents' education and number of children may influence the prevalence of dental caries among 13–19-year-old students.

**Keywords**: Oral health, Dental caries, DMF index, significant caries index, Oral hygiene

## INTRODUCTION

Dental caries is one of the most common infectious diseases that the majority of people may experience.[1] It has been well controlled in adolescents to some extent in many developed countries.[2] However, preventive methods and knowledge about tooth caries prevalence are necessary to

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reduce its prevalence. These factors are also important for dental health programs.[3] There are different caries indexes, including DMFT (Decayed, Missing and Filled Teeth) and SiC index (Significant Caries Index). DMFT index is a routine indicator used to evaluate dental health status in many studies for over 50 years.[4] Despite its wide application there are some shortcomings; for example it cannot detect high-risk individuals in a population with skewed distribution of tooth caries.[5] SiC index, introduced in 2000 by Bratthall,[6] reflects dental status of high-risk individuals even in a society with low mean DMFT and high percentage of caries-free subjects.[7] SiC index is the mean DMFT of one-third of the population with the highest DMFT scores.[5] Although some studies have been conducted in Iran in order to measure tooth caries prevalence,[8–10] almost all of them have used DMFT index, which does not detect high-risk individuals and there are a few studies that have evaluated dental caries prevalence according to socio-demographic characteristics of the population.[8] Previous studies in Iran have concentrated on children or adults,[8–10] but not on adolescents and young adults who are at increased risk for tooth decay and oral health status.[11] It seems that evaluation of their dental status is a research priority to detect preventive and therapeutic needs in many countries. The aim of this study was to measure tooth caries prevalence in 13–19-year-old students in Hamadan, Iran, using two different caries indicators, including DMFT and SiC indexes.

## MATERIALS AND METHODS

### Samples

This descriptive cross-sectional study was carried out in Hamadan, Iran, from February to March 2010. The total of 398 teenage (13–19-year-old) students, including 196 boys and 202 girls, participated in the present study; the subjects were selected through stratified cluster sampling method. The subjects and their parents were informed about the nature of the study and informed consent forms were signed by the parents prior to the study.

### Data collection

Data were collected via interview and clinical examination. For each participant a questionnaire was completed, which contained information about sex (boy or girl), age (13–16, 16–19), parents' educational status (up to high school, high school to B.S., above B.S.), history of professional fluoride therapy (yes or no), brushing habits (no brushing, once per day, more than once per day) and number of children in the family (one, two, more than two).

### Clinical examination

An examiner, trained and calibrated according to WHO instructions [12] for tooth caries diagnosis, examined the participants in school classroom chairs. Prior to examination, the teeth were isolated by

cotton rolls for precise detection of dental caries. A WHO periodontal probe, a #4 plane mouth mirror and a portable 60-W white light, as a source of illumination, were used for dental examination. Wisdom teeth were excluded from the examination. Teeth lost or restored due to trauma, orthodontic treatment or esthetic reasons was not considered as missing or filled teeth.

For each student, decayed (D), missing (M) and filled teeth were detected and DMFT were calculated. After calculating DMFT index, the participants were sorted according to their DMFT values. The mean DMFT of one-third of the participants who reached the highest DMFT values was considered SiC index.

### Statistical analysis

Data were analyzed by SPSS 13. Independent t-test and one-way ANOVA were used to compare the mean DMFT and SiC indexes. Statistical significance was defined at $P<0.05$.

## RESULTS

The mean DMFT values and SiC index were 3.35±2.22 and 6.62±1.92, respectively. Table 1 presents the distribution of participants according to sex, age, fluoride therapy, frequency of brushing per day, parents' education and number of children in the family. The mean and standard deviation of DMFT values as well as P-value for each group are also presented in Table 1. Statistical analysis showed no significant differences between the mean values of DMFT of both genders (P=0.145); however, the mean value of DMFT was significantly different in respect to age (0.025), fluoride therapy (0.000), frequency of brushing per day (0.000), as well as number of children in the family (0.001). Data related to SiC index, including distribution of the students, standard deviation, SiC index for different groups and P-values are presented in table brushing. There was a significant difference between SiC indexes according to sex (0.003), age (0.000), and previous fluoride therapy (0.006) and fathers education (0.008).

**Table 1: Distribution of participants, mean and standard deviation of DMFT index by sex, age, fluoride therapy, brushing habits, parents' education and number of children**

| Variable | | Number (%) | DMFT±SD | P* |
|---|---|---|---|---|
| Sex | boy | 196(49.20) | 3.56±2.85 | 0.145 |
| | girl | 202(50.80) | 3.15±2.63 | |
| Age | 13-16 | 197(49.50) | 3.04±2.49 | 0.025 |
| | 16-19 | 201(50.50) | 3.66±2.95 | |
| Professional fluoride therapy | yes | 92(23.10) | 1.55±1.39 | 0.000 |
| | no | 306(76.90) | 3.89±2.82 | |
| Brushing times per day | 0 | 137(34.40) | 5.33±2.78 | 0.000 |
| | 1 | 212(53.30) | 2.51±2.24 | |
| | >1 | 49(12.30) | 1.44±0.76 | |
| Father's education | Up to high school | 43(10.80) | 5.90±3.15 | 0.000 |
| | High school to B.S. | 284(71.40) | 2.91±2.62 | |
| | Above B.S. | 71(17.80) | 3.56±2.07 | |
| Mother's education | Up to high school | 65(16.30) | 5.46±2.87 | 0.000 |
| | High school to B.S. | 289(72.60) | 2.93±2.60 | |
| | Above B.S. | 44(11.10) | 3.04±2.07 | |
| Number of children in the family | 1 | 41(10.30) | 2.09±0.96 | 0.001 |
| | 2 | 209(52.50) | 3.25±2.98 | |
| | >2 | 148(37.20) | 3.84±2.62 | |

* P-value of <0.05 was considered significant.

**Table 2: Distribution of participants, mean and standard deviation of SiC index by sex, age, fluoride therapy, brushing habit, parent's education and number of children**

| Variable | | Number (%) | SiC±SD | P* |
|---|---|---|---|---|
| Sex | boy | 63(47.02) | 7.11±1.73 | 0.003 |
| | girl | 71(52.98) | 6.11±1.98 | |
| Age | 13-16 | 69(51.50) | 5.88±1.78 | 0.000 |
| | 16-19 | 65(48.50) | 7.32±1.81 | |
| Professional fluoride therapy | Yes | 9(6.70) | 4.88±1.05 | 0.006 |
| | No | 125(93.30) | 6.70±1.92 | |
| Brushing times per day | 0 | 102(76.10) | 6.60±1.89 | 0.784 |
| | 1 | 32(23.90) | 6.50±2.06 | |
| | >1 | 0(00.00) | 0 | |
| Father's education | Up to high school | 31(23.10) | 7.45±2.18 | 0.008 |
| | High school to B.S. | 86(64.20) | 6.22±1.82 | |
| | Above B.S. | 17(12.70) | 6.82±1.46 | |
| Mother's education | Up to high school | 48(45.80) | 6.79±1.98 | 0.641 |
| | High school to B.S. | 78(58.20) | 6.47±1.96 | |
| | Above B.S. | 8(6.00) | 6.37±1.18 | |
| Number of children in family | 1 | 1(0.76) | 5.00±0.00 | 0.198 |
| | 2 | 65(48.50) | 6.81±2.23 | |
| | >2 | 68(50.74) | 6.38±1.58 | |

* P-value of <0.05 was considered significant.

## DISCUSSION

Dental caries is the most common chronic disease of the oral cavity and a large proportion of the population experience it in their life span.[1] The estimation of its prevalence has an important role in improving oral health.

According to the results of the present study, the mean DMFT value and SiC index of 13–19-year-old students were 3.35±2.22 and 6.62±1.92, respectively. Although SiC index was introduced to evaluate dental caries status of 12-year-old children, it was used in the present study for 13–19-year-olds in order to assess the prevalence of tooth caries in the high-risk group of students. The results are almost similar to the results reported by Pakshir,[13] Hessari et

al [10] and Hamissi et al.[12] Pakshir showed that the mean DMFT value of 15–19-year-olds was 4.1.[13] Hessary et al reported that the mean DMFT value of 18-year-old individuals was 4.3.[10] Hamissi et al observed that the mean DMFT value was 2.71 in 15–16-year-old students.[12] Yazdani et al [14] showed that the SiC index for 15-year-old students of Tehran, the capital of Iran, was 5.2.[15] Based on WHO data,[15] the mean DMFT value for some neighboring countries are different. The mean DMFT values of 15-year-old individuals in Lebanon, Kuwait and Pakistan were 5.4, 3.9 and 1.54, respectively. The results reported by Al-Sadhan[16] indicated that the mean DMFT value of 12–14-year-old schoolchildren in Riyadh was 5.9. Analysis of the results of this study indicated that although there were no significant differences between the mean values of DMFT of boys and girls, the SiC index of boys was significantly higher than that in girls, similar to the results reported by Hessari et al.[10] Contrary to the results of this study, Lukacs[17] reported that sex may affect tooth caries prevalence. The results of the present study showed that the mean values of SiC and DMFT of 13–16-year-olds were significantly lower than those of 16–19-year-old students. In Iran, in order to reduce teeth caries prevalence, there are some preventive approaches for children under 12 years of age, such as fissure sealants for first molars and fluoride mouthwashes for free. These preventive plans may be responsible for this significant difference. A relatively low percentage of the population (23.1%) participating in the current study had undergone previous professional fluoride therapy; however, the results showed that those who had had fluoride therapy significantly experienced less dental caries than the others, Which might be attributed to the effect of fluoride on dental caries prevention but it seems more studies are necessary because this significant difference may also be the results of other factors such as brushing habits, nutrition etc. According to the results of this study, similar to the findings of Tagliaferro et al,[18] the brushing habit reduced the mean value of DMFT significantly, but there was no significant relationship between brushing frequency per day and SiC index. As showed in Table 2, in high-risk population nobody used to brush more than once per day and a high percentage (76.1%) of them did not brush during the day. This skewed distribution may fade the effects of brushing in the high-risk group. Based on the results of the present study, the level of parents' education could affect DMFT value and SiC index, consistent with the results reported by Grindefjord et al.[19] Parents' education could be an effective factor either in their knowledge about the importance of oral health or their economic status, which may result in better oral health status. Analysis of the results showed that the

mean DMFT value, but not SiC index, was significantly different in terms of the number of children. The lowest mean value was calculated for those who had no siblings. Similar to the results of this study, Schroth et al[20] reported that the prevalence of primary tooth decay was significantly associated with the number of children in the family, which might be attributed to the focused attention of parents to their child. It should be noted that in the high-risk group in which SiC index was calculated, there was just one person who was the only child of the family, and there were no significant differences between two and more children. Probably other factors played more important roles in dental caries experience.

## CONCLUSION

The tooth caries experience of 13–19-year-old schoolchildren of Hamadan, Iran, is relatively similar to that in neighboring countries. Age, fluoride therapy, tooth brushing, parents' education and the number of children in the family can influence the prevalence of tooth caries among 13–19-year-old students. Implementation of programs to decrease dental caries prevalence, especially in high-risk groups of the society, is necessary and further national surveys are needed to assess and monitor the existent oral health programs.

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