Original Article

Evaluation of Decayed, Missing and Filled Teeth (DMFT) Index in the 8-12 Years Old Students of Zahedan City, Iran

Foroogh Amirabadi[1]   *Edris Bazrafshan[2]   Javid Dehghan[3]   Mohammad Ali Zazouli[4]

1- Department of Pediatric Dentistry, Children and Adolescent Health Research Center, School of Dentistry, Zahedan University of Medical Science, Zahedan, Iran
2- Department of Environmental Health, School of Health AND Health Promotion Research Center, Zahedan University of Medical Sciences, Zahedan, Iran
3- Department of Community Medicine, School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran
4- Department of Environmental Health, School of Health, Health Sciences Research Center, Mazandaran University of Medical Sciences, Sari, Iran

ed_bazrafshan@yahoo.com

Abstract

Background and purpose: Dental caries or tooth decay is one of the most important health problems in human life. In addition, tooth decay is an infectious disease that affects all populations Worldwide. The purpose of this study was to determine the decayed, missing and filled teeth (DMFT) index among a representative sample of 8-12 years old school children in Zahedan City, Iran.

Materials and Methods: This descriptive and cross-sectional study was performed in 2012-2013 on 1500 (774 girls and 726 boys) 8-12 years old students were randomly selected in Zahedan City (South East of Iran) to assess the DMFT index. The DMFT index was determined using the standard method suggested by World Health Organization (WHO) and data were analyzed using SPSS software (version 18.0) and presented as mean ± standard deviation (SD).

Results: It was observed that 43.6% of the individuals had at least one teeth lesion. The mean and SD of DMFT value for all ages was 1.02 ± 1.36. Male children had higher mean DMFT score of 1.01 ± 1.41 compared with 1.00 ± 1.41 for females (P > 0.05). Also, maximum DMFT (1.38 ± 1.62) was observed among students that never seen a dentist per year. Analysis of variance analysis showed that there is not a significant correlation between DMFT index and brushing times.

Conclusion: According to the results of this study, the mean DMFT scores in 8-12 years old students are lower than the global standards suggested by WHO.

*[Amirabadi F, *Bazrafshan E, Dehghan J, Zazouli MA.* **Evaluation of Decayed, Missing and Filled Teeth (DMFT) Index in the 8-12 Years Old Students of Zahedan City, Iran.** *IJHS 2015; 3(2): 52-60]* http://jhs.mazums.ac.ir*

Key words: Dental Caries, Decayed, Missing and Filled Teeth, Drinking Water, Fluoride

1. Introduction

The public health and subsequently the health of the public have a great impact on development, capacities, and abilities of the community (1). In addition, collecting epidemiological data concerning dental health and morbidity is of primary importance, as has been recommended and stressed by the World Health Organization (WHO) (2,3). In fact, dental caries is a major oral health problem among children in both developed and developing countries and among the most significant dental problems, it is extensively believed that tooth decay is rising quickly, particularly in developing countries and enforces a heavy cost on the public. Nonetheless, during the past decades the common agreement from various reports worldwide was that dental caries had declined considerably and were continuing to decline in populations. The dental community has prided itself on efforts that have reduced dental caries including the use of systemic and topical fluorides, toothpaste, sealants, progresses in diet, oral health education and dental care (4,5). However, some studies that have been reported recently revealed alarming increases in caries.

In accordance with the Health Office Report of Ministry of Health, Treatment and Medical Education, prevalence of dental caries among elementary students is 68%. Dental health indexes are not only indicators of health status, but also can be features of the socioeconomic condition. One of these indexes is decayed, missing and filled teeth (DMFT), which is used as oral health evaluation criteria in most researches. The DMFT index has been widely utilized in epidemiological surveys of oral health. WHO recommended assessing and comparing the experience of dental caries in various populations. DMFT expresses the mean number of DMFT in a group of individuals (1,6).

According to the WHO, about 60-90% of school children worldwide have dental caries. The global target specified in the year of 2000 was to ensure that 50% of children worldwide aged 5-6 years would be caries-free and that the average DMFT in permanent dentition index would be reduced to lower than 3.0 at 12 years of age. By 2011, the global average DMFT index for school children at 12 years of age was equal 1.67 and 78% of countries have a DMFT index more than 3.0 (7).

In accord with the United States Surgeon General's report, dental caries problem is declared to be the most frequent chronic childhood disease of children aged 5-17 years and is 5 times more common than asthma and 7 times more common than hay fever. The extent and acuteness of dental caries in primary and permanent teeth continue to be a serious problem and should receive unique attention (8). In addition, a WHO assessment of global DMFT for 12 year old children reported that in the 188 countries involved in their database, that on a global basis, 200, 335, 280 teeth were decayed, filled or missing among just that age group (9).

Many parameters including oral hygiene habits, nutrition, cultural, social, economical, racial habits of the target populations and low concentration of fluoride in drinking water can have an effect on DMFT index (10). Fluoride in drinking water is usually the main source of fluoride intake, and excessive consumption of fluoride can cause a wide range of adverse health effects.

Fluoride is an essential element for human health. However, excess fluoride may cause dental and/or skeletal fluorosis whereas, in areas that are deficient in fluorine, fluoridation of drinking water or other methods of fluorine supplementation may reduce the incidence of dental caries. Research on the relationship between fluoride concentration in drinking water and dental caries has been conducted for more than 60 years (11-17). In 1984, WHO defined drinking water fluoridation as a safe and economical measure of preventing dental caries and recommended that it be adopted in

fluoride deficiency countries (11). Drinking water containing 0.7-1.2 mg/L natural or added fluoride is beneficial to children during the time they are developing permanent teeth. An optimum level fluoride in drinking water is 1.0 mg/L in temperate climates (18).

At the present time, most of population in Zahedan city (Southeast of Iran) acquires their required drinking water from public distribution system and others from desalination units in the city, which desalinates the water using the reverse osmosis method. The fluoride concentration in water from desalination units is very low and consequently this water mixed partially with raw water, nevertheless fluoride concentration in final water is less than normal range. Furthermore, the mean concentration of fluoride in bottled drinking water samples sold in Iran is 0.3 mg/L with a range of 0.00-0.59 mg/L that is less than optimal level (19). Consequently, low concentration of fluoride in consumed drinking water can aid to increase of DMFT index among 8-12 years old students.

This cross-sectional study focused on 16 elementary schools in four regions of Zahedan and explores the correlation between oral health status and oral hygiene habits, caregivers' assistance in oral hygiene habits, and the use of dental health care via a questionnaire and an oral examination of school children. The aim was to determine DMFT index in the 8-12 years old students in Zahedan city and also the determination of fluoride concentration in drinking water in the studied area and its compared with standard values.

2. Materials and Methods

This descriptive and cross-sectional study was conducted during 2012-2013 on 1500 (774 girls and 726 boys) 8-12 years old students who were randomly selected in Zahedan city of Sistan and Baluchestan Province in southeastern Iran (Figure 1) to assess the DMFT index. The area of the present study is situated between 29°29′33″ N latitude and 60°52′01″E longitude at an altitude of 1,352 m above sea level. It has a semiarid to arid climate with an average yearly temperature 18.2°C and the average annual rainfall is <100 mm.

A multistage sampling was performed in this study. First, Zahedan city was divided into four districts within which four schools were randomly selected. The number of boys and girls from a sample of 1500 (774 girls and 726 boys) people was selected through visiting 16 elementary schools, the share of each school was determined according to its students' register. Respecting the number of students of different classes, the share of each class in each school was determined and samples were selected randomly.

An oral health examination of all the participants was conducted by two dentists who had sufficient clinical experience for this purpose. The design of the oral health examination form is derived from the diagnostic methods and standards for the oral health examination survey released by the WHO (20) and it was appropriately modified according to the dentist's clinical experience. The number and conditions of the deciduous and permanent teeth of the children were recorded.

Furthermore, the questionnaires were completed by the students under the guidance of school teachers and the content includes the demographic information on the student, their parents or their primary caregiver, including the sex and age of the student, as well as the education level and occupation of their parents or primary caregiver, the oral hygiene habits of the school children, such as frequency of brushing, duration of brushing, oral hygiene techniques (such as using dental floss), and oral hygiene habits, the student's perception of dental caries, the student's dental health care experience, and the student's oral health knowledge, such as knowledge of the main cause of dental caries and the main methods of preventing dental caries.
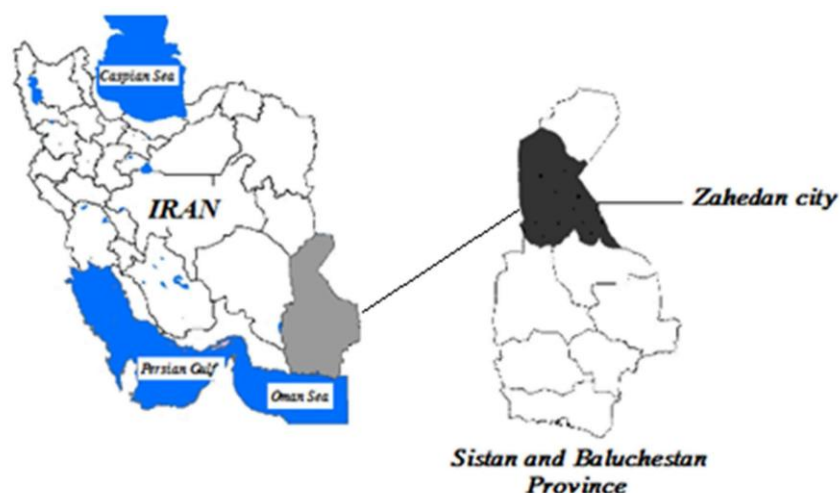
Figure 1. Location of studied area

Finally, the DMFT prevalence was determined in the samples, and its real rate (confidence interval) with 95% probability was estimated in the population and the role of sex and age on DMFT occurrence was assessed.

Statistical analysis was used to produce a frequency distribution table, percentages, averages, and standard deviations for the data collected. In addition, *t*-tests and analysis of variance (ANOVA) were applied to analyze, compare, and evaluate the oral health status of the different sexes and ages [by using SPSS (version 16.2, SPSS Inc., Chicago, IL)]. P = 0.05 were considered indicative of a statistically significant difference.

3. Results

In this study, more than 1500 8-12 years old students at 16 elementary schools in Zahedan city were included as participants. The actual number of students who was 1500, among whom 774 (51.6%) students were girls and 726 (48.4%) were boys.

As shown in table 1, the mean DMFT value was 1.01 ± 1.41 and 1.0 ± 1.41 in the boys and girls respectively and totally was 1.005 ± 1.41. The results showed that DMFT index in boys is higher than girls and this difference was statistically not significant ($P > 0.05$).

According to data presented in figure 2 and table 1, decayed teeth were maximum prevalence (75.8%) and filling teeth was minimum prevalence (1.8%). The mean values of decayed (D) teeth in boys are more than girls, but the mean values of missing (M) teeth and filled (F) teeth in girls are more than boys. Furthermore, according to results of this study, 56.4% of the students were caries-free.

The results (Table 1) showed that M (missing) was the highest and D (decayed) was the lowest index among all the boys. This fact reflects neglect of oral hygiene and lack of attention to treating decayed teeth.

Table 1. DMFT prevalence among 8-12 years old students according to gender status

Sex	D	M	F	DMF index
Boys	0.88 ± 1.32	0.12 ± 0.46	0.01 ± 0.09	1.01 ± 1.41
Girls	0.83 ± 1.22	0.15 ± 0.57	0.02 ± 0.17	1.0 ± 1.41

DMF: Decayed, missing and filled

Table 2 shows that the maximum DMFT prevalence is related to 12 years old students (1.31 ± 1.68) and the minimum DMFT prevalence is related to 8 years old students (0.76 ± 1.21). In addition according to results presented in table 3, the maximum DMFT prevalence is related to group with tooth brushing as occasionally.
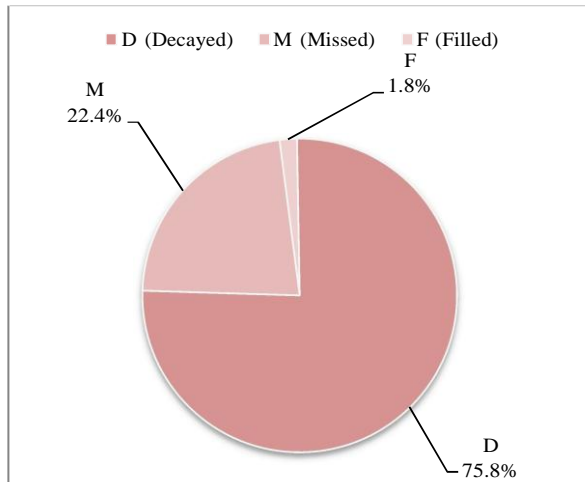
Table 4 gives DMFT prevalence among 8-12 years old students of elementary schools in Zahedan city based on referral to a dentist. In addition, DMFT prevalence among 8-12 years old students of elementary schools based on dental floss using has presented in table 5. Table 6 gives the frequency of brushing habits among a total of studied population. As it can be seen from table 6, 28.5% of students never used a brush for tooth cleaning.

The results of the questionnaire showed that 63.1% students had consulted and visited dentist at least one time. Furthermore, 25.3% students brushed their teeth twice or more than a day, 42.1% once a day and 28.1% did not use tooth-brush at all. In addition, according to findings of this study only 8.6% of students used dental floss and more than 91% of studied students never treated by a dentist. Furthermore, 1027 (68.47%) students only went to a dentist when they had a dental problem and 168 students (11.2%) had never visited a dentist.

Figure 2. Percent of decayed, missing and filled indexes among total of studied population

Table 2. DMFT prevalence among 8-12 years old students in Zahedan city according to age

Age (year)	D	M	F	DMF index
8	0.66 ± 1.13	0.09 ± 0.48	0.01 ± 0.10	0.76 ± 1.21
9	0.77 ± 1.10	0.12 ± 0.47	0.01 ± 0.11	0.90 ± 1.21
10	0.85 ± 1.20	0.07 ± 0.38	0.01 ± 0.10	0.93 ± 1.27
11	0.98 ± 1.32	0.20 ± 0.62	0.02 ± 0.18	1.20 ± 1.45
12	1.09 ± 1.56	0.19 ± 0.60	0.02 ± 0.17	1.31 ± 1.68

DMFT: Decayed, missing and filled teeth

Table 3. DMFT prevalence among 8-12 years old students in Zahedan city according to tooth brushing

Brushing	D	M	F	DMF index
Never	0.90 ± 1.32	0.14 ± 0.54	0.00 ± 0.00	1.04 ± 1.41
Occasionally	1.04 ± 1.41	0.10 ± 0.46	0.03 ± 0.17	1.18 ± 1.51
One time	0.83 ± 1.30	0.12 ± 0.50	0.02 ± 0.17	0.97 ± 1.4
Twice and more	0.82 ± 1.15	0.15 ± 0.55	0.01 ± 0.12	0.98 ± 1.28

DMFT: Decayed, missing and filled teeth

Table 4. DMFT prevalence among 8-12 years old students of elementary schools in Zahedan city based on referral to dentist

Visit of dentists	D	M	F	DMF index
Never	1.12 ± 1.40	0.12 ± 0.32	0.15 ± 0.46	1.38 ± 1.62
One time	0.80 ± 1.23	0.14 ± 0.54	0.03 ± 0.20	0.96 ± 1.35
Twice	0.89 ± 1.18	0.14 ± 0.47	0.00 ± 0.00	1.03 ± 1.28
Three time and more a year	0.87 ± 1.30	0.13 ± 0.52	0.00 ± 0.00	1.01 ± 1.4

DMFT: Decayed, missing and filled teeth

Table 5. DMFT prevalence among 8-12 years old students of elementary schools in Zahedan city based on dental floss using

Dental floss using	D	M	F	DMF index
Yes	0.87 ± 1.24	0.1 ± 0.45	0.04 ± 0.22	1.01 ± 1.33
No	0.87 ± 1.27	0.14 ± 0.53	0.01 ± 0.12	1.02 ± 1.38

DMFT: Decayed, missing and filled teeth

Table 6. Brushing habits among total of studied population

Never	Occasionally	One time	Twice and more	Total
422	67	632	379	1500
28.1%	4.5%	42.1%	25.3%	100%

4. Discussion

According to results of this study, the mean DMFT values in boys (1.01 ± 1.41) were higher than girls (1.00 ± 1.41), but this difference was not statistically significant (P > 0.05). In contrast, The DMFT of 12 year old students of Behshahr city shown that the DMFT of girls (1.75 ± 0.19) was more than DMFT value of boys (1.21 ± 0.16), total average was equal to 1.48 ± 0.13, while the average fluoride concentration in drinking water of this city was equal 0.25 mg/L (21) and also prevalence of DMFT equal 2.98 ± 1.95 in the 12 years old of students of Baboul town, Iran, was reported by Mahyaee. According to findings of Mahyaee the DMFT value in girls was more than in boys (21). Furthermore, a different study in Dayer city (in Iran) on students showed that DMFT value in girls is more than boys (P < 0.05) (22). Similarly, Chan et al. (23) investigated the oral health status of school children in southern Taiwan in 2009 and found that for the deft and DMFT index for mixed dentition, girls had higher scores (3.63 ± 3.31) than boys (3.52 ± 3.35). In addition, they found that the prevalence of dental caries for girls (53.49%) was higher than that for boys (52.02%), and that boys had a higher filling rate (56.31 ± 39.70%) than girls (56.07 ± 38.52%); no significant difference was observed between sexes.

Similar findings were also found in the study of Chen (24), where the DMFT index of girls with respect to permanent dentition (2.99 ± 3.40) was significantly higher than that of boys (2.33 ± 2.93; P < 0.05). In addition, the dental caries rate (36.9%) in permanent teeth for girls was also higher than for boys (34.32%). Yang et al. (25) examined the DMFT index for permanent teeth and found that girls had a higher score of 1.87 ± 0.16 than boys (1.31 ± 0.12; P < 0.05) and that the prevalence of dental caries among girls for permanent dentition (60.1%) was also higher than for boys (48.0%; P < 0.05). However, the mean DMFT score equal 1.80 ± 1.75 (1.95 ± 1.91 and 1.65 ± 1.55 in the boys' and girls' group, respectively) had reported by Daneshkazemi and Davari (26).

Furthermore, according to the results of the present study, the DMFT scores in 8-12 years old students are lower than the global standards suggested by WHO references (1.02 ± 1.36 vs. 1.5). The DMFT index of the children between 6 and 9 years old in Mianeh city, Iran, was 0.347 ± 0.09 and 1.41 ± 0.161 for permanent teeth and 6.98 ± 0.44 and 8.02 ± 0.32 for milk teeth, which are higher than national mean (27).

In Asia, the DMFT index for children at the age of 12 years in Singapore in 2011 was the lowest at 0.6, followed by Japan with a score of 1.4. With the exception of Cambodia's score of 3.5 and the Philippines' score of 3.3 in 2011, the DMFT indices for the various Asian countries for children at the age of 12 years are all lower than 3.0. In addition, according to the findings obtained from the 11

elementary schools in Xiulin Township DMFT index for permanent dentition was 0.68 (7). However, the prevalence of dental caries among children aged 5-6 years in Taiwan was 79.32% in 2011. Furthermore, the DMFT index for children aged 12 years in Taiwan was 3.31 in 2000. Although the index had improved to 2.58 in 2006 (28), it remains above the global average, which indicates that there is still a need for further improvements in the dental health of children in Taiwan.

As stated earlier the mean DMFT score in the study area for all ages was 1.02 ± 1.36 with D component of 75.8%, M component of 22.4% and F component of 1.8% (Figure 2). It is clear from table 2 that DMFT index has increased with aging. The mean DMFT score in Saudi Arabic was 7.05 ($\pm$ 4.58) with D component of 6.02, M component of 0.46 and F component of 0.57 (29).

According to findings of this study, DMFT prevalence among 8-12 years old students of elementary schools, which used dental floss after eating was less than other. Nevertheless, this difference was not significant ($P > 0.05$).

As presented in table 4, maximum DMFT (1.38 ± 1.62) was observed among students that never seen a dentist per year. Furthermore, ANOVA analysis showed that there is not a significant correlation between DMFT index and brushing times.

As for the category of brushing teeth after eating, the minority of the students 67 (4.5%) sometimes brushed their teeth after eating and sometimes did not. A total of 632 (42.1%) students brushed their teeth every day, whereas 422 (28.1%) students did not brush their teeth daily. Furthermore, a total of 379 (25.3%) students brushed their teeth twice or more every day.

In summary, children with poor oral hygiene habits have poor oral health. Although the analyses of health care habits and oral health status of school children did not show significant differences, the prevalence of dental caries among children who have never seen a dentist and among children who only see a dentist when they have dental problems is higher than among those who have regular or occasional check-ups.

At present study, the mean concentration of fluoride in 12 samples from different points of distribution system in the city was 0.83 ± 0.11 mg/L that is less than the guideline by WHO (1.5 mg/L) (18), and hence the accessibility of supplementary sources of fluoride must also be considered and taken into account in the planning of programs in public health dentistry. It can be assumed that a low concentration of fluoride in drinking water can increase the rate of DMFT prevalence in children's. The results of a study that was performed by Aghdasi et al. study showed a weak relationship between fluoride concentrations and DMFT index in Piranshahr students, Iran, (correlation coefficient of <0.035), while this value for Poldasht students, Iran, was found higher (correlation coefficient 0.575) (30). Nonetheless, Rahmani et al. (31) and Bazrafshan et al. (32) were reported that, although there is a relationship between dental caries and fluoride levels of drinking water, this relationship is not significant and in the case of low levels of fluoride in drinking water, there will be no need to add fluoride to drinking water and it may be supplemented in other sources.

References

1. Tohidast Akrad Z, Beitollahi JM, Khajetorab AA. DMFT (decayed, missing, filled, teeth) oral health index in sweets and cable industry workers. Iran J Public Health 2006; 35(2): 64-8.

2. Aggeryd T. Goals for oral health in the year 2000: cooperation between WHO, FDI and the national dental associations. Int Dent J 1983; 33(1): 55-9.
3. Barmes DE. Indicators for oral health and their implications for developing countries. Int Dent J 1983; 33(1): 60-6.
4. First International Conference on Declining Caries. J Dent Res 1982; 61(Sp Iss).
5. Second International Conference on Declining Caries. J Dent Res 1994; 73(Sp Iss).
6. Cypriano S, de Sousa ML, Wada RS. Evaluation of simplified DMFT indices in epidemiological surveys of dental caries. Rev Saude Publica 2005; 39(2): 285-92.
7. Cheng YC, Huang HK, Wu CH, Chen CC, Yeh JI. Correlation between dental caries and diet, oral hygiene habits, and other indicators among elementary school students in Xiulin Township, Hualien County, Taiwan. Tzu Chi Medical Journal 2014; 26(4): 175-81.
8. Bagramian RA, Garcia-Godoy F, Volpe AR. The global increase in dental caries. A pending public health crisis. Am J Dent 2009; 22(1): 3-8.
9. Bratthall D. Estimation of global DMFT for 12-year-olds in 2004. Int Dent J 2005; 55(6): 370-2.
10. Pehrsson PR, Pehrssona PR, Cutrufelli RC, Pattersona KY, Wilger J, Haytowitz DB, et al. Sampling and initial findings for a study of fluoride in drinking water in the United States. J Food Compost Anal 2006; 19(S45): S52.
11. Wang B, Zheng B, Zhai C, Yu G, Liu X. Relationship between fluorine in drinking water and dental health of residents in some large cities in China. Environ Int 2004; 30(8): 1067-73.
12. Viswanathan G, Jaswanth A, Gopalakrishnan S, Siva IS, Aditya G. Determining the optimal fluoride concentration in drinking water for fluoride endemic regions in South India. Sci Total Environ 2009; 407(20): 5298-307.
13. Burgstahler AW. Fluoridated bottled water. Fluoride 2006; 39(4): 252-4.
14. Shivarajashankara YM, Shivashankara AR, Rao HS, Bhat GP. Oxidative stress in children with endemic skeletal fluorosis. Fluoride 2001; 34(2): 103-7.

15. Spittle B. Dyspepsia associated with fluoridated water. Fluoride 2008; 41(1): 89-92.
16. Carton RJ. Review of 2006 United States National Research Council report on Fluoride in drinking water. Fluoride 2006; 39(3): 163-72.
17. Dobaradaran S, Mahvi AH, Dehdashti S, Ranjbar D, Abadia V. Drinking water fluoride and child dental caries in Dashtestan, Iran. Fluoride 2008; 41(3):220-6.
18. Nemerow NL, Agardy FJ, Sullivan P, Salvato JA. Environmental engineering, water, wastewater, soil and groundwater treatment and remediation. 6th ed. New York, NY: Wiley; 2009. p. 23-6.
19. Dobaradaran S, Mahvi AH, Dehdashtia S. Fluoride content of bottled drinking water available in Iran. Fluoride 2008; 41(1): 93-4.
20. Oral health surveys: basic methods. World Health Organization. 4th ed. Geneva, Switzerland: WHO; 2015.
21. Mahvi AH, Zazouli MA, Younecian M, Nicpour B, Babapour A. Survey of Fluoride concentration in drinking water sources and prevalence of DMFT in the 12 years old students in Behshahr city. Journal of Medical Sciences 2006; 6(4): 658-61.
22. Ramezani GH, Valaei N, Eikani H. Prevalence of DMFT and fluorosis in the students of Dayer city (Iran). J Indian Soc Pedod Prev Dent 2004; 22(2): 49-53.
23. Chan MH, Huang ST, Lin YJ, Yen YY, Chen HS. Dental caries, sweetened-snack taking, and oral hygiene practices among school children in Southern Taiwan. Taiwan Journal of Oral Medicine Sciences 2009; 25(2): 31-46.
24. Chen HS. National survey of oral health status of children and adolescents in Taiwan. Health Promotion Administration Technology Research and Development Program (2005-2006) [Online]. [cited 2014 Jul 17]; Available from: URL: http://www.hpa.gov.tw/
25. Yang YH, Hu SW, Shieh TY, Huang ST, Chou MY, pan WH. Elementary schoolchildren's nutrition and health survey in Taiwan 2001-2002-an association of caries condition with the consumption of sweet snacks and dairy products. Chin Dent J 2006; 25(3): 169-82.

26. Daneshkazemi AR, Davari A. Assessment of DMFT and enamel hypoplasia among junior high school children in Iran. J Contemp Dent Pract 2005; 6(4): 85-92.

27. Fazlzadeh Davil M, Mazloomi S, Heibati B, Miranzadeh MB, Heidari M. Drinking water fluoride concentration and its relationship with decayed, missing, and filled teeth index in Mianeh, Iran. International Journal of Environmental Health Engineering 2012; 1(8): 1-5.

28. Huang ST, Ho YT, Chung YM, Lin YS, Wang NT, Hsiao SY. Dental health status and treatment needs of elementary school children in Taiwan. J Dent Sci 2007; 2(2): 103-9.

29. Al-Dosari A, Wyne A, Akpata E, Khan N. Caries prevalence among secondary school children in Riyadh and Qaseem. Saudi Dental Journal 2003; 15(2): 96-9.

30. Aghdasi H, Gholami-Borujeni F, Behzadpoor M, Hoseini F, Habibzadeh T. A survey of relationship between drinking water fluoride concentration and DMFT index in guidance school students: a case study Piranshahr and poldasht, west Azerbayjan. Urmia Med J 2014; 25(3): 199-207. [In Persian]

31. Rahmani A, Rahmani K, Mahvi AH, Usefie M, Drinking water fluoride and child dental caries in Noorabademamasani, Iran. Fluoride 2010; 43(3): 188-94.

32. Bazrafshan E, Kamani H, Kord Mostafapour F, Mahvi AH. Determination of the decayed, missing, filled teeth index in Iranian students: a case study of Zahedan City. Health Scope 2012; 1(2): 84-8.