DOI: *http://dx.doi.org/10.22122/johoe.v10i4.1347* *Published by Vesnu Publications*

Received: 28 May 2021 **Accepted: 06 Aug. 2021**

Nutritional patterns and prevalence of dental caries in the armed forces and their families in Tehran Province, Iran

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Original Article

Abstract

BACKGROUND AND AIM: Oral health is one of the components of public health with a significant effect on quality of life (QOL). Dental caries can lead to irreversible damage, pain, public health concerns, loss of self-confidence, and lower QOL. Furthermore, nutrition plays an important role in preventing oral diseases, such as developmental defects, dental caries, oral mucosa pathologies, and periodontal problems. The present study was conducted with the aim to investigate the relationship between nutrition and dental caries in the armed forces personnel and their families in Tehran Province, Iran.

METHODS: This descriptive, cross-sectional study was conducted on 800 armed forces personnel and their families. Individuals referring to the dentistry examination units in 3 ETKA chain stores in the north, middle, and south of Tehran were included in the study. The Decayed, Missing, and Filled Teeth (DMFT) index was used for reporting dental caries. The standard Food Frequency Questionnaire (FFQ) was used to evaluate nutrition intake. Data were analyzed using SPSS software. Kruskal-Wallis and chi-square tests were used to compare the study groups.

RESULTS: Mean DMFT/dmft in the first, second, third, and fourth quartiles was 2.85, 6.6, 10.85, and 17, respectively, and the mean DMFT/dmft was 9.32. The majority of the study population consisted of married women, 63.4% of the participants brushed their teeth with a toothpaste, and 48.5% brushed their teeth once a day. After adjusting for the confounding factors, carbohydrates, fruits, and lipids showed a significant relationship with the DMFT index.

CONCLUSION: According to the mean DMFT/dmft in this study, it can be concluded that the prevalence of dental caries in the subjects was moderately severe. According to this study, changes in nutritional patterns and oral health care education are crucial for the Iranian armed forces. A diet with a low carbohydrates and cariogenic fruits content and high lipids content is suggested based on the findings of this study.

KEYWORDS: Dental Caries; Dental Health Services; Nutritional Status; Oral Health

Citation: Yazdanian M, Tahmasebi E, Hesam-Arefi A, Salesi M, Parastouei K. **Nutritional patterns and prevalence of dental caries in the armed forces and their families in Tehran Province, Iran.** J Oral Health Oral Epidemiol 2021; 10(4): 209-17.

Oral health is an essential part of general health, and chronic diseases such as obesity, cardiovascular diseases (CVDs), diabetes, and dental caries have common risk factors.[1] Dental caries is considered as a global public health problem due to its high prevalence and significant impact on society.[2] It has been shown that the development of dental caries depends on socioeconomic, cultural, political, and environmental factors.[3] Diet plays an essential role in the prevention of oral diseases such as developmental defects, dental caries, dental erosion, oral mucosal problems, and periodontal problems.[4] The nutrients required for the body are divided into the 2 categories of macronutrients and micronutrients. Macronutrients include

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carbohydrates, proteins, and fats, and micronutrients include vitamins and minerals. In the diet of most communities, carbohydrates are the main source of energy.[5]

The synthesis of extracellular polysaccharides from sucrose sources is much faster than their synthesis using glucose, fructose, and lactose. Thus, sucrose has the highest cariogenic potential. Since sucrose is the most widely consumed sugar, it plays a very important role in the development of dental caries. For example, bread, cheese, fruits, and milk have relatively low sucrose content and are therefore classified as non-cariogenic. The method and frequency of nutrition intake are also very important.[6]

In recent decades, sugary drinks and fast foods have led to widespread dietary changes in populations. This modern diet is an important factor in dental caries in different communities.[7] In a study by Jain and Gary, the frequency and quantity of consuming sugary drinks and snacks, plaque index, and age were significantly associated with dental caries.[8] Their study showed that both nutritional and oral hygiene factors play an equal role in dental caries. Sugary drinks are a much stronger indicator of dental caries than snacks.[8]

Dietary patterns that increase the risk of dental caries include consistent and long-term consumption of foods containing sugars, sticky foods, and sugary drinks.[9] Consumption of milk reduces the incidence of dental caries.[10] Consumption of along with increases salivary flow and cleans teeth naturally. This type of food includes carrots, apples, and celery.[9]

Epidemiological findings have shown that the sugars in fruits and lactose in milk and dairy products do not affect dental caries.[11] The basic criteria for assessing oral health are the dmft and Decayed, Missing, and Filled Teeth (DMFT) indices, which provide much information for social oral health planning.[12]

The UK nutritional guideline recommends a vegetable-based diet for favorable oral health, which includes at least 2 meals of fruit and 3 meals of vegetables a day, a maximum of 1 meal of 70 grams of red meat daily, and at least 2 meals of fish per week.[13]

Khalilazar and Khoshdel examined oral health indicators in the military personnel of the Islamic Republic of Iran.[14] The mean age of their participants was 34 years. Their mean DMFT index was 9.67. In this study, naval personnel had lower oral health than the other groups. Moreover, they reported a positive correlation between heart disease and high DMFT. They concluded that although the military personnel's oral health status was better than that of the general population, there was still a need for oral health training, especially among navy and air force personnel.[14]

Hessari et al. conducted a study to evaluate oral health status in individuals aged 35-44 years in Iran.[15] The mean DMFT index was 11, which was significantly higher in urban residents, women, and those with higher incomes. They concluded that oral health status is unfavorable in Iranian adults, especially those with low education and social status.[15]

Pournaghi-Azar et al. conducted a systematic review and meta-analysis on 35 articles to evaluate DMFT in Iranian children and adults.[16] In this study, the mean DMFT index was 3.65, and the mean DMFT index in children, adults, and children with physical/mental problems was 2.3, 8.6, and 3.85, respectively. They concluded that the DMFT index of the Iranian population was higher than that the presented in the World Health Organization (WHO) Fourth Plan.[16]

To prevent dental caries, consumption of sugary drinks should be reduced, especially in children and adolescents.[17] Consuming multiple sugary snacks with French fries, sweets, popcorn, and ice cream increases the risk of dental caries.[18] Data indicate that by limiting the consumption of sugars to < 5%, the risk of dental caries will be minimized throughout an individual's lifetime.[19]

According to domestic and foreign studies, the mean DMFT/dmft in Iran is

high, and the country is one of the high-risk countries in terms of dental caries. Another important point is that there is a significant relationship between sugar consumption and dental caries in most studies. Another important variable that has been mentioned in most studies as a determining factor in the DMFT index is oral hygiene and frequency of brushing. Economic and social status has been studied as an effective factor in this regard in several studies. The results of studies differ regarding the incidence of caries in different genders. In general, most studies have suggested the reducing of sugar intake to reduce the DMFT/dmft index.

The prevalence of dental caries is high in Iran, and has adverse effects on the quality of life (QOL) of individuals in the society, especially military personnel, who should be healthy physically and mentally. Dental caries impact physical condition by changing the nutritional status of armed forces and their unique lifestyle and can cause more dental caries due to stress and bad dietary habits. Furthermore, dental caries imposes high costs on the government and health care system because of the Armed Forces Insurance (AFI) that should cover armed forces personnel and their families in all kinds of dental treatments.

Therefore, oral health conditions and dietary habits are among the main priorities of the health system transformation plan and the Ministry of Health for prevention programs. Therefore, the present study aimed to evaluate the relationship between food intake and dental caries in Iranian armed forces personnel and their families in Tehran Province, Iran.

Methods

This descriptive, cross-sectional study was conducted on 800 personnel of the armed forces and their families in Tehran Province after coordination with the Armed Forces Medical Services Organization (AFMSO) in 2017. The inclusion criteria were having AFI and age of 4 to 50 years. The subjects' were examined on a mobile dental unit moved to 3 ETKA chain stores located in the north, center, and south of Tehran. The subjects read and signed the informed consent form to participate in the research. Oral examinations were performed by dental health providers under a standard examination light and using a standard unit position.

To determine dental caries, the DMFT index was used, which is one of the most common indicators for assessing the prevalence and severity of dental caries in permanent teeth. It indicates the number of decayed, extracted, and filled teeth. DMFT/dmft index is divided into the first, second, third, and fourth quartiles with DMFT/dmft < 5, 5.9-8, 9-13.9, and > 13.9, respectively. Thus, if any lesions were found on smooth dental surfaces or in pits and fissures where the layer beneath the enamel was hollow, or the floor and surrounding area were soft, the tooth was considered decayed. Each tooth treated with a temporary filling was considered as a decayed tooth, and if a filled tooth was decayed, it was included in the decayed tooth category. In the case of proximal surfaces, caries was diagnosed if the tip of the explorer was caught in the cavity. Otherwise, in case of any doubt, the tooth was considered sound.

The standard Food Frequency Questionnaire (FFQ) was used to determine the amount of food intake (nutrients and food groups) in the subjects. The validity and reliability of the FFQ have been confirmed.[20,21] Data were analyzed using descriptive statistics (mean, standard deviation, etc.) in SPSS software (version 26, IBM Corporation, Armonk, NY). Kruskal-Wallis and chi-square tests were used to compare the groups. The chi-square test was used for comparison of qualitative variables. To evaluate nutritional intake for each DMFT quartile, as the DMFT is a 4-state variable and food variables are quantitative, the ANOVA or ANCOVA can be used for data with normal distribution and Kruskal-Wallis for data with abnormal distribution. A linear

regression test was used to investigate the relationship of food intake, including nutritional groups, micronutrients, and macronutrients, as the independent variable with the DMFT index as the dependent variable with normal distribution. Only the DMFT variable showed a normal distribution among the studied variables; all food intake variables showed abnormal distribution. Thus, the Kruskal-Wallis test and the Middle domain were used in this study. The Healthy Eating Index (HEI) is a measure that assesses the compliance of a set of foods with the Dietary Guidelines for Americans (DGA).[22]

Results

Dental health providers examined 800 personnel of the armed forces and their families. Among the participants, 160 individuals were men, and 479 were women. Only 9 teenagers and children under 19 years of age participated in this study. Most of the participants were young adults (19 to 29 years old). Of the 800 participants, 736 were armed forces personnel, and the rest (n = 64) were their families. The collected data showed that 63.4% of the subjects used toothbrushes and toothpaste to brush their teeth, and approximately 48.5% of the subjects brushed once a day (Table 1). Table 2 results show that most subjects were married women.

Tables 3 and 4 present the distribution of total energy intake, comprising macronutrient intake including protein, carbohydrates, and fats both as grams per day and a percentage of total energy intake, micronutrient intake including potassium, phosphorus, magnesium, and calcium, and nutrition including bread, cereals, fruits, vegetables, legumes, meats, dairy products, salt, and fiber, which were evaluated in terms of an increase in the DMFT index. For carbohydrates, the first and fourth quartiles showed a statistically significant difference ($P < 0.050$, $\beta = 0.09$). For fruits, the first quartile showed a statistically significant relationship with the second quartile and the third quartile with the fourth quartile ($P < 0.050$, $\beta = 0.27$). The analyses showed that with an increase in the percentage of carbohydrates and fruit intake and decrease in the percentage of fat intake, DMFT index increased significantly.

Table 1. Oral hygiene parameters in terms of Decayed, Missing, and Filled Teeth (DMFT)

DMFT index	Total population	The first quartile	The second quartile	The third quartile	The fourth quartile	P*
		< 5	5-8.9	9-13.9	> 13.9	
The tooth cleaning tool [n (%)]						0.190
Toothbrush + toothpaste	430 (63.4)	85 (61.2)	115 (63.5)	159 (65.4)	71 (61.7)	
Toothbrush + toothpaste + dental floss	147 (21.7)	39 (28.1)	38 (21.0)	43 (17.1)	27 (23.5)	
Toothbrush + toothpaste + toothpick	66 (9.7)	10 (7.2)	23 (12.7)	25 (10.3)	8 (7.0)	
Dental floss	2 (0.3)	0 (0)	0 (0)	2 (0.8)	0 (0)	
Toothpick	2 (0.3)	0 (0)	1 (0.6)	0 (0)	1 (0.9)	
Others	31 (4.6)	5 (3.6)	4 (2.2)	14 (5.8)	8 (7.0)	
Tooth brushing frequency [n (%)]						0.001
Seldom	54 (8.0)	7 (5.1)	2 (1.1)	19 (7.9)	26 (22.8)	
Sometimes	199 (29.6)	26 (19.0)	57 (31.8)	88 (36.4)	28 (24.6)	
Once a day	326 (48.5)	74 (54.0)	100 (55.9)	104 (43.0)	48 (42.1)	
Twice a day	79 (11.8)	24 (17.5)	18 (10.8)	26 (10.7)	11 (9.6)	
> Twice a day	14 (2.1)	6 (4.4)	2 (1.1)	5 (2.1)	1 (0.9)	
Tobacco use [n (%)]						0.001
Yes	30 (28.0)	51 (23.9)	20 (12.9)	10 (10.5)	111 (19.5)	
No	77 (72.0)	162 (76.1)	135 (87.1)	85 (89.5)	459 (80.5)	

DMFT: Decayed, Missing, and Filled Teeth
*Chi-square test was used.

Table 2. Distribution of demographic characteristics in terms of Decayed, Missing, and Filled Teeth (DMFT)

DMFT index	Total population	The first quartile	The second quartile	The third quartile	The fourth quartile	P*
		< 5	5-8.9	9-13.9	> 13.9	
Marital status [n (%)]						
Married	553 (84.2)	100 (75.8)	137 (78.3)	208 (88.6)	108 (93.9)	0.001
Single	104 (15.8)	32 (24.2)	38 (21.7)	27 (11.4)	7 (6.1)	
Gender [n (%)]						
Male	160 (25.0)	57 (44.6)	31 (17.9)	44 (19.2)	28 (25.7)	0.001
Female	479 (75.0)	71 (55.2)	142 (82.1)	185 (80.2)	81 (74.3)	
Education [n (%)]						
High school graduate and lower	23 (19.3)			31 (13.9)	50 (43.5)	0.001
Associate degree	42 (35.3)			60 (26.9)	25 (21.7)	
Bachelor's degree	41 (35.5)			107 (48.0)	32 (27.8)	
Master's degree and higher	13 (10.9)			25 (11.2)	8 (7.0)	
Age (year) [n (%)]						
< 19	9 (6.7)			1 (0.4)	0 (0)	0.001
19-29	78 (57.7)			36 (14.9)	9 (7.5)	
29-39	32 (23.7)			112 (43.3)	31 (27.8)	
> 40	16 (11.9)			93 (38.4)	80 (66.7)	

DMFT: Decayed, Missing, and Filled Teeth
*Chi-square test was used.

For the percentage of fat intake, the fourth quartile also showed a statistically significant relationship with the first quartile.

However, the changes in other cases were not significant. The mean DMFT in the first, second, third, and fourth quartiles was 2.85, 6.60, 10.85, and 17, respectively. The overall mean DMFT/dmft in this study was 9.32.

Table 3. Distribution of the intake of macronutrients, micronutrients, and different nutrients in terms of Decayed, Missing, and Filled Teeth (DMFT)

DMFT index	The first quartile	The second quartile	The third quartile	The fourth quartile	P*
	< 5	5-8.9	9-13.9	> 13.9	
Overall energy received (kcal/day)	2778 (2209-3638)	2738 (2183-3428)	2740 (2176-3413)	2760 (2112-3604)	0.990
Carbohydrate (g/day)	402 (303-503)	396 (302-504)	524 (314-408)	422 (314-527)	0.660
Protein (g/day)	107 (83-138)	104 (82-127)	103 (80-132)	103 (80-133)	0.730
Fat (g/day)	92 (68-116)	85 (68-110)	85 (65-112)	82 (61-120)	0.370
Carbohydrate (%)	58 (52-62)[a]	59 (53-63)	59 (55-64)	61 (56-65)[b]	0.005*
Protein (%)	15 (14-17)	14 (13-17)	15 (13-16)	15 (14-17)	0.210
Fat (%)	29 (25-34)[c]	29 (25-34)	28 (25-32)	27 (24-32)[d]	0.045*
Phosphorus (mg/day)	1860 (1320-2471)	1715 (1344-2191)	1787 (1355-2303)	1869 (1294-2309)	0.810
Potassium (mg/day)	4350 (3143-6168)	3997 (33130-5570)	4344 (3133-5896)	4345 (3361-5993)	0.480
Magnesium (mg/day)	494 (360-681)	483 (374-625)	504 (373-696)	540 (384-674)	0.510
Calcium (mg/day)	1289 (913-1916)	1282 (918-1787)	1274 (956-1817)	1310 (938-1771)	0.910
Bread and grains (g/day)	472 (316-774)	527 (349-705)	507 (374-704)	501 (396-724)	0.560
Fruits (g/day)	217 (140-374)[e]	265 (159-417)[f]	286 (161-499)[g]	310 (149-605)[h]	0.013*
Vegetables (g/day)	194 (121-302)	163 (113-256)	173 (116-294)	178 (128-331)	0.250
Cereals (g/day)	50 (26-84)	39 (23-69)	44 (24-80)	43 (22-87)	0.330
Meats (g/day)	14 (8-27)	17 (10-26)	16 (8-24)	15 (7-26)	0.250
Salt (g/day)	1.5 (0.43-3)	3 (0.43-3)	1.5 (0.43-3)	1.8 (0.2-3)	0.450
Dairy products (g/day)	351 (181-567)	292 (144-551)	310 (175-563)	316 (163-554)	0.690
Fibers (g/day)	58 (41-81)	59 (41-81)	58 (43-81)	57 (46-84)	0.550

*Kruskal-Wallis test was used.
A statistically significant difference was observed between a and b, c and d, e and f, and g and h ($P < 0.05$).

Table 4. Determination of Decayed, Missing, and Filled Teeth (DMFT) in healthy food intake pattern quartiles

HEI score	First quartile	Second quartile	Third quartile	Fourth quartile	P
DMFT index					
Raw model*	8.43 ± 4.56	9.64 ± 5.10	8.91 ± 4.80	9.88 ± 5.74	0.550
Modified model**	9.16 ± 3.96	9.81 ± 4.70	9.10 ± 4.81	10.30 ± 5.75	0.610

HEI: Healthy Eating Index; DMFT: Decayed, Missing, and Filled Teeth
*ANCOVA was used.
**The model was modified for gender, smoking, and tooth brushing frequency.

Table 4 shows that in the raw models, the increase in carbohydrate and fruit intake was linearly associated with an increase in the DMFT index, whereas increase in the percentage of protein and fat intake was linearly associated with a decrease in the DMFT index. By adjusting the confounding factors, an increase in the percentage of carbohydrate and fruit intake was associated with an increase in the DMFT index. Adjustments were made for gender, frequency of brushing, and smoking.

According to the results presented in table 5, the DMFT index did not change significantly with increase in healthy nutrition intake in any of the raw models or models modified for gender, smoking, and brushing frequency.

As shown in table 6, there was no relationship between healthy food patterns and DMFT.

Table 5. The relationship between macronutrients and nutrient groups and Decayed, Missing, and Filled Teeth (DMFT)

Variable	Beta ± Standard error	Confidence interval	P
Carbohydrate (%)			
Raw model*	0.090 ± 0.030	0.040, 0.150	0.001
Modified model**	-0.080 ± 0.030	0.020, 0.140	0.008
Protein (%)			
Raw model*	-0.160 ± 0.080	-0.310, -0.007	0.040
Modified model**	-0.110 ± 0.080	-0.270, 0.060	0.210
Fat (%)			
Raw model*	0.070 ± 0.030	-0.130, -0.22	0.020
Modified model**	-0.060 ± 0.030	-0.120, 0.004	0.060
Bread and grains (g/day)			
Raw model*	0.001 ± 0.001	-0.001, 0.002	0.450
Modified model**	0.001 ± 0.001	-0.001, 0.002	0.720
Fruits (g/day)			
Raw model*	0.270 ± 0.080	0.100, 0.440	0.002
Modified model**	0.220 ± 0.080	0.050, 0.320	0.020
Vegetables (g/day)			
Raw model*	0.003 ± 0.001	-0.001, 0.002	0.880
Modified model**	0.002 ± 0.001	-0.001, 0.002	0.250
Cereals (g/day)			
Raw model*	-0.001 ± 0.003	-0.008, 0.006	0.720
Modified model**	0.001 ± 0.004	-0.007, 0.007	0.990
Meats (g/day)			
Raw model*	-0.004 ± 0.002	-0.008, 0.001	0.020
Modified model**	-0.007 ± 0.001	-0.003, 0.002	0.100
Dairy products (g/day)			
Raw model*	-0.001 ± 0.001	-0.002, 0.001	0.510
Modified model**	0.001 ± 0.001	-0.001, 0.002	0.740
Fibers (g/day)			
Raw model*	-0.001 ± 0.006	-0.010, 0.010	0.940
Modified model**	-0.001 ± 0.007	-0.010, 0.010	0.920

*Linear regression was used for calculation. The dependent variable is DMFT, and other variables are independent.
**Model 1: Modified for gender, the frequency of tooth brushing, and smoking

Table 6. The relationship between healthy food pattern and Decayed, Missing, and Filled Teeth (DMFT)

Variable	Beta ± Standard error	Confidence interval	P
DMFT index			
Raw model	0.04 ± 0.20	0.003, 0.08	0.035
Model 1	0.04 ± 0.20	0.003, 0.09	0.060

Discussion

The present study showed that an increase in the percentage of carbohydrate consumption relative to the total daily energy increases the prevalence of dental caries, which is consistent with the results of many previous studies.[6,8,9] The WHO has recommended < 10% consumption of sugars to prevent dental caries.[23] In contrast to many other studies indicating the anti-caries properties of fruits, in the present study, increasing fruit consumption during the day (grams/day) increased susceptibility to caries. This could be due to the carbohydrate component of fruits. The only foodstuff that reduced susceptibility to caries in the present study were fats, which is consistent with the results of other studies.[5,11]

In the present study, no significant relationship was found between the consumption of other foodstuffs, and dental caries and the DMFT index despite examining different foodstuff types. Moreover, no significant relationship was observed between healthy nutrition patterns and DMFT index.

In the study by Jain[24] and the present study, the consumption of sugary drinks was considered as the most important predictor of dental caries. However, an important consideration in the present results was the significant relationship between high carbohydrate intake and caries, but the frequency of its consumption, which has been considered important in many studies, was not significantly associated with dental caries.

In the present study, fruit consumption increased the risk of dental caries, which is inconsistent with the results of many studies.[9] Furthermore, fructose (fruit sugar) has a cariogenic potential, and not all fruits contain antioxidants. These differences in the structure and composition of different fruits might have led to this relationship.[6] In the present study, no significant relationship was observed between consumption of dairy products and dental caries, which is inconsistent with the results of various studies.[11] However, to compare different studies, several factors, such as sample size, age group, quality of examination, the predominant diet at the study site, etc., should be considered. Due to differences in the results of previous studies, the discrepancies between the results of the present study and other studies are not unexpected.

The only foodstuffs in the present study with a protective effect on dental caries were fats. In general, fats have a positive effect on oral health.[11,25] Omega-3 fatty acids are beneficial for both periodontal health and preventing dental caries.[5]

Since dental caries has significant burden on society and nutrition has an important role in many diseases with a common etiology, including dental caries, it is very useful to determine the relationship between dental caries and nutrition, especially in military personnel, which leads to an improvement in the nutritional habits.

Using such studies to report to policymakers and for large-scale planning to change military personnel's nutritional patterns through education and relying on such studies can reduce caries and other nutrition-related diseases.

The comparison of the mean DMFT (9.32) in the present study with that (9.67) in the study by Khalilazar and Khoshdel[14] which examined the DMFT of the army personnel of the Islamic Republic of Iran showed almost similar results. According to these 2 studies, it can be concluded that the dental caries status of military personnel is unfavorable, and

DMFT is relatively high in these individuals. The advantage of the present study over the study by Khalilazar and Khoshdel is the inclusion of nutritional indicators.[14] The armed forces and their families do not have a healthy diet, which can affect the prevalence of dental caries in these individuals.

Another advantage of the present study, in addition to the one mentioned above, is the search for the causes of dental caries by examining nutritional factors, oral health, education, etc.

According to the study by Pournaghi-Azar et al.,[16] it can be concluded that due to the limited sample size of the present study, the mean DMFT in the military personnel and their families is higher than the average values.

Conclusion

According to the results of the present study, it can be concluded that an unhealthy nutritional pattern in the personnel of the armed forces in Tehran Province is associated with high prevalence of dental caries. The recommended diet for caries prevention should include the least amount of fermentable carbohydrates and cariogenic fruits, and a reasonable amount of fat.

Further studies with larger sample sizes are recommended in centers with more opportunities to complete forms, perform examination, and classify different age groups.

Conflict of Interests

Authors have no conflict of interest.

Acknowledgments

The authors appreciate the cooperation of the Research Assistant of Baqiyatallah University of Medical Sciences, Tehran, Iran.

References

1. Blackwell D, Dalton M. Food, diet and oral health. J Ir Dent Assoc 2011; 57(4): 191-4.
2. Shamsi M, Hidarnia A, Niknami S, Khorsandi M. The status of dental caries and some acting factors in a sample of Iranian women with pregnancy. World Journal of Medical Sciences 2013; 9(4): 190-7.
3. Fallahi A, Ghofranipour F, Ahmadi F, Malekafzali B, Hajizadeh E. Challenges of Iranian adolescents for preventing dental caries. Iran Red Crescent Med J 2014; 16(9): e15009.
4. Kooshki A, Rivandi M, Behroozikhah M, Akbarzadeh R. Relationship between DMF Index and food intake in elementary students (Sabzevar, Iran). Journal of Biomedicine 2016; 1(4): 9423.
5. Zohoori FV, Duckworth RM. The impact of nutrition and diet on oral health. Basel, Switzerland: S. Karger AG; 2019.
6. Chankanka O, Levy SM, Marshall TA, Cavanaugh JE, Warren JJ, Broffitt B, et al. The associations between dietary intakes from 36 to 60 months of age and primary dentition non-cavitated caries and cavitated caries. J Public Health Dent 2015; 75(4): 265-73.
7. Samman MB. The effect of diet drinks on oral health among us children and adults: Cluster analysis [Thesis]. Boston University; 2018.
8. Jain P, Gary JJ. Which is a stronger indicator of dental caries: oral hygiene, food, or beverage? A clinical study. Gen Dent 2014; 62(3): 63-8.
9. Alotaibi T. Malnutrition and diet role in prevention of oral disease. EC Dental Science 2019; 18(9): 2206-13.
10. Taylor GW, Stumpos ML, Kerschbaum W, Inglehart MR. Educating dental students about diet-related behavior change: Does experiential learning work? J Dent Educ 2014; 78(1): 64-74.
11. Watt RG, Rouxel PL. Dental caries, sugars and food policy. Arch Dis Child 2012; 97(9): 769-72.
12. Ghandahari-Motlagh M, Zeraati H. Dental Health Status in 3-5-Year-Old Kindergarten Children in Tehran-Iran in 2003. Frontiers in Dentistry 2005; 2(1): 18-20.
13. Logan D, McEvoy CT, McKenna G, Kee F, Linden G, Woodside JV. Association between oral health status and future dietary intake and diet quality in older men: The PRIME study. J Dent 2020; 92: 103265.
14. Khalilazar L, Khoshdel AR. Oral health profile in Iranian Armed Force: Focusing on prevention strategies. J Arch Mil Med 2016; 4(2): e39275.
15. Hessari H, Vehkalahti MM, Eghbal MJ, Murtomaa HT. Oral health among 35- to 44-year-old Iranians. Med Princ Pract 2007; 16(4): 280-5.
16. Pournaghi-Azar F, Asl-Aminabadi N, Jamali Z, Azami A, Hazem K, Azami-Aghdash S, et al. Status of decayed, missing, filled teeth index among Iranian children and adults: A systematic review and meta-analysis. J Anal Res Clin Med 2018; 6(2): 55-66.

17. Pitchika V, Standl M, Harris C, Thiering E, Hickel R, Heinrich J, et al. Association of sugar-sweetened drinks with caries in 10- and 15-year-olds. BMC Oral Health 2020; 20(1): 81.
18. Johansson I, Holgerson PL, Kressin NR, Nunn ME, Tanner AC. Snacking habits and caries in young children. Caries Res 2010; 44(5): 421-30.
19. Freeman R. Moderate evidence support a relationship between sugar intake and dental caries. Evid Based Dent 2014; 15(4): 98-9.
20. Shinga-Ishihara C, Nakai Y, Milgrom P, Murakami K, Matsumoto-Nakano M. Cross-cultural validity of a dietary questionnaire for studies of dental caries risk in Japanese. BMC Oral Health 2014; 14: 1.
21. Esfahani FH, Asghari G, Mirmiran P, Azizi F. Reproducibility and relative validity of food group intake in a food frequency questionnaire developed for the Tehran Lipid and Glucose Study. J Epidemiol 2010; 20(2): 150-8.
22. Guenther PM, Casavale KO, Reedy J, Kirkpatrick SI, Hiza HA, Kuczynski KJ, et al. Update of the Healthy Eating Index: HEI-2010. J Acad Nutr Diet 2013; 113(4): 569-80.
23. Moynihan P. Sugars and dental caries: Evidence for Setting a recommended threshold for intake. Adv Nutr 2016; 7(1): 149-56.
24. Jain M. Effect of cariogenic food exposure on prevalence of dental caries among fee and non-fee paying school children, Udaipur, India. Pesqui Bras Odontopediatria Clin Integr 2010; 10(3): 331-6.
25. O'Connor JP, Milledge KL, O'Leary F, Cumming R, Eberhard J, Hirani V. Poor dietary intake of nutrients and food groups are associated with increased risk of periodontal disease among community-dwelling older adults: a systematic literature review. Nutr Rev 2020; 78(2): 175-88.