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"Evaluation of the effect of nutrition and oral hygiene on Dmft index of patients applying to restorative dentistry clinic"

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Abstract

Objectives The aim of this study was to investigate the effects of diet, oral hygiene, visits to the dentist, and body mass index (BMI) on the risk of dental decay.

Methods 240 patients aged 18–50 were included in the study. Participants completed a questionnaire that included demographic information and oral hygiene habits. They were also required to submit dietary analysis forms, which asked about the foods and amounts consumed at breakfast, lunch, dinner, and during two snacks. Intraoral and radiographic examinations of the patients were performed, and the values for DMFT, plaque index, dental calculus index, and oral hygiene index (OHI-S) were recorded. Statistical analysis, including Chi-square tests, independent samples t-tests, and one-way ANOVA, was conducted on the data ($p < 0.05$).

Results The oral hygiene index(OHI-S) was determined to be good in 58.3% of the study participants and poor in 10%. No statistical difference was found between BMI and DMFT index ($p > 0{,}005$). When the relationship between food consumption frequencies and DMFT was evaluated, it was determined that there was no statistically significant relationship between bread, rice, milk, legumes, and DMFT values ($p > 0{,}005$), but there was a statistically significant relationship between fruit, vegetables, yoghurt, cheese, meat/chicken/fish, eggs, honey, sugar, glutens, acidic drinks, tae/coffee consumption and DMFT indices ($p < 0{,}005$).

Conclusion The types of food consumed by patients and the frequency of consumption affect the risk of caries.

Keywords DMFT index, Body mass index, Decay, Food, Dietary habits

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Introduction

Dental decay is a preventable chronic disease, which develops through the mediation of biofilm and can be modulated with diet. The basis of this disease is the tendency for fermentable carbohydrates to accumulate on the dental surface over time. The balance of oral flora, in other words the biofilm, is disrupted as a result of this accumulation [1]. Decay lesions start with demineralisation in dental hard tissues and are defined by changes occurring in these tissues and inflammatory reactions in the pulp [2].

There is a dynamic balance between pathological and protective factors in the formation of dental decay. As a result of fermentation of carbohydrates ingested in the diet, organic acids are produced, and these organic acids constitute a local risk factor by leading to demineralisation in the dental hard tissues [3]. The frequency of carbohydrate consumption, the type of carbohydrates consumed, and oral hygiene habits play an important role in the development of decay. The consumption of sticky foods and the absence of subsequent effective tooth brushing in particular can accelerate the formation of decay [4]. Carbohydrates that start to be digested in the mouth due to the amylase enzyme in saliva are known as "fermentable carbohydrates". Many animal and human studies hav shown that fermentable carbohydrates, especially sugars, are an important food component that promotes dental decay [5]. Modifications that can be made in dietary habits are extremely important in reducing the risk of dental decay in an individual.

Recent studies have demonstrated the role of the intestinal microbiome in local and systemic diseases, including obesity [6]. The oral cavity functions as a microbial reservoir for the intestinal microbiome, and oral bacteria, even in healthy people, are advanced to the intestines with the saliva swallowed [7]. It has been suggested that intestinal microbes can affect eating behaviours by manipulating the feeling of fullness [8]. In the same way, oral bacteria and their metabolisms can affect taste perceptions and preferences in the oral cavity. This can lead to a change in food consumption. These mechanisms can rationally explain the link between oral health and the development of obesity [9, 10]. Moreover, oral diseases can be a finding accompanying obesity or a complication. In other words, obesity alters the oral microbiota, and it has been suggested that these changes can lead to oral diseases.

Good oral hygiene habits are considered to be important for the prevention of dental decay in all age groups. The routine recommendation is to brush the teeth twice a day with a fluoride toothpaste and to clean interdental spaces with dental floss once a day. Tooth brushing and interproximal cleaning removes dental plaque and reduces the concentration of pathogens causing decay. In this way, demineralisation will be prevented and it is thought that remineralisation of damaged dental structures will be supported with fluoride [11].

Thomoson et al. [12] reported that there could be a correlation between regular visits to a dentist and better oral health. Visiting a dentist is not only a therapeutic component, but also helps to improve oral health in the general population through educational interventions delivered by health. Although there are many studies evaluating these habits in children and adolescents [13–15], studies among adults are limited [16].

Therefore, the aim of this study was to investigate the effects of diet and tooth brushing habits, visits to the dentist, and body mass index (BMI) on the risk of dental decay.

The null hypothesis (H0) of the study is: "Oral hygiene habits and diet have no effect on the dmft index."

Material and method

Ethics approval for this study was obtained from the Afyonkarahisar Health Sciences University Non-Interventional Clinical Research Ethics Committee (Decision Date: 15.12.2023, Decision No: 2023-13).This study was conducted in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.This prospective, cross-sectional study included patients who presented at the Restorative Dental Treatment Departments of a university Dental Faculty between January 2024 and June 2024 written and verbal informed consent was obtained from all patients participating in the study, and confidentiality of all personal information was ensured.

In our clinic, an average of 60 patients per week and approximately 1500 patients per 6 months are treated in accordance with the study criteria. When the effect size was determined as 0.25, confidence interval: 0.05 (type 1 alpha error), and the power was 0.80, the minimum sample size for the study was found to be 216 with the f test family one-way Anova analysis. 240 patients were included in the study with systematic sampling.

Study inclusion and exclusion criteria

Male and female patients in the age range of 18–50 years were included in the study. Patients were excluded if they had any chronic inflammatory or autoimmune disease, were using glucocorticoid, anti-anxiety drugs, antidepressants, or anti-epileptic drugs, had hypertension, diabetes, or endocrine disease, had a diagnosis of or were receiving treatment for a malignancy, or had fewer than 16 teeth.

Data collection

All the dental examinations of all the patients were performed by a dentist with experience in this field of at least 10 years.

Data were collected related to the variables of age (years), gender, weight (kg), height (cm), body mass index (BMI-kg/m^2), smoking status, frequency of visits to a dentist, tooth brushing habits, use of interdental brush- dental floss, and dietary habits. BMI is calculated as weight divided by height squared and expressed as kg/m^2. BMI, based on the classification by the World Health Organization; <18.5 kg/m^2: Underweight; 18.5–24.9 kg/m^2: Normal; 25–29.9 kg/m^2: Overweight; 30–34.9 kg/m^2: Obesity Class 1; > 40 kg/m^2: Obesity is considered as Class 2 [17].

Food and beverages were divided into categories. Beverages were classified as carbonated drinks (cola, soda), tea and coffee; foods, proteins, milk and dairy products, fresh and dried fruits, added sugars (chocolate, honey, jam, candy, etc.), cooked starches with sugar (cookies, cakes, biscuits, etc.), processed starches (potato chips, pastry products, crackers, etc.) and unprocessed starches (potatoes, bread, rice, soup, etc.) according to their sugar or starch content [18, 19].

Frequency of consumption of food types was assessed using the dietary analysis form. (supplementry file 1) Food consumption frequency was separated into 6 subgroups. Group 1: once a month, Group 2: once-twice a week, Group 3: three-four times a week, Group 4: once-twice a day, Group 5: three-four times a day, Group 6: five-six times a day.

Oral health status

All the examinations of the oral cavity were performed by the same qualified dental specialist. Panoramic radiographs (Dentsply Sirona, Germany) were taken of all the patients; decayed, missing and filled teeth (DMFT) were examined and recorded. The DMFT index is the standard method of evaluating the dental decay experience, and is a separate variable with a value between 0 and 28 corresponding to the possible number of teeth [20]care professionals in dental surgeries. For each patient, the DMFT index was evaluated with oral examination and radiography. The DMFT index is the total of the number of permanent teeth with caries, the number of permanent teeth lost because of decay, and the number of permanent teeth treated because of decay. Third molars were not included in the index. Therefore, a higher index value indicates a greater number of missing, filled and decayed teeth of the patient.

Severe tooth loss is defined as having less than 9 teeth [21].The number of remaining teeth were counted, and in line with the Japan Gerontology Association's [22] definition of good oral function patients with 20 or more teeth the majority of our dataset consisted of individuals with. Patients with 16–19 remaining teeth generally represent moderate tooth loss that directly affects oral health and quality of life. For this reason, patients with at least 16 teeth were included in the study [23]. Only 13 patients had between 16 and 19 teeth.

For the quantitative evaluation of the oral hygiene status of the patients, the Oral Hygiene Index- Simple (OHI-S) was used. This index is a scoring method that is considered the sum of the Plaque Index (PI) and the Calculus Index (DI). Six teeth numbered 16, 26, 11, 31, 36, and 46, considered representative of all anterior and posterior teeth, were evaluated. The buccal surfaces of teeth 16-26-11-31 and the lingual surfaces of teeth 36–46 were assessed using a 0–3 rating scale. The oral hygiene status of the patients was recorded according to these points as 0–2 points: good, 2.1-4 points: moderate, 4.1-6 points: poor [24].

Statistical analysis

Data obtained in the study were analyzed statistically using IBM SPSS vn. 25.0 software. Descriptive statistcs were stated as mean ± standard deviation (SD) values for continuous variables and as number (n) and percentage (%) for categorical variables. Conformity of continuous varriables to normal distribution was assessed with the Shapiro Wilk test. Independent sample T Test was used for two groups and variance analysis(ANOVA) was used for three groups for analysis of normally distributed data. Correlations between classified variables were examined in 2×2 and 2×3 cross-tables with the Pearson Chi-square independence test. A value of $p < 0.05$ was accepted as statistically significant.

Results

Evaluation was made of 240 patients, comprising 151 (62.9%) females and 89 (37.1%) males with a mean age of 31.1 years (range, 18–50 years).

It was determined that 15% of the patients smoked, 42.1% brushed their teeth twice a day, and 26.7% used dental floss. Most of the patients (72.5%) visited a dentist when they had a complaint. The sociodemographic characteristics and oral hygiene habits of the patients are presented in Table 1.

Oral hygiene was determined to be good in 58.3% of the study participants and poor in 10%. The oral hygiene of male subjects was seen to be significantly better than that of females ($p = 0.01$). As the education level of the subjects increased, so there was an increase in good oral hygiene. The oral hygiene index of those who brushed their teeth once or twice a day was statistically significantly good ($p < 0.05$) (Table 2).

Table 1 Sociodemographic characteristics and oral habits

		n	percent
Gender	female	151	62,9%
	male	89	37,1%
Education	primary education	71	29,6%
	high school	84	35,0%
	university	85	35,4%
Body mass index	healthy	123	51,3%
	fat	89	37,1%
	obese	28	11,7%
Smoking	no	204	85,0%
	yes	36	15,0%
Brushing teeth	occasionally	59	24,6%
	1 time per day	80	33,3%
	2 times a day	101	42,1%
Dental floss-interface brush	no	176	73,3%
	yes	64	26,7%
Frequency of visits to Dentist	as long as there is a complaint	174	72,5%
	once a year	30	12,5%
	once every six months	36	15,0%

No significant relationship was determined between the OHI and the frequency of visits to the dentist and use of dental floss.

The sociodemographic characteristics and oral hygiene habits of the subjects were compared with the DMFT index. No significant difference was determined according to gender, BMI, and smoking status ($p > 0.05$). As the education level increased, the DMFT index decreased. As the frequency of tooth brushing and visits to the dentist increased, the DMFT index was determined to statistically significantly decrease ($p < 0.001$) (Table 3).

Food consumption frequency was compared with the DMFT index (Table 4):

The DMFT index values were seen to be similar for the food consumption frequency groups in respect of bread, rice/pasta, milk, and pulses.

According to the One-Way ANOVA analysis, there was a significant difference in the consumption frequencies of fruit, cheese, and tea/coffee, but no difference was determined in the subgroup analyses.

Patients with Group 4 fruit consumption frequency were observed to have a higher DMFT value than those with Group 3 frequency.

Patients with Group 1 frequency of red meat, chicken, and fish consumption were determined to have significantly higher DMFT values than those with Group 3 and Group 4 frequencies.

Patients with Group 1 frequency of yoghourt consumption were determined to have significantly higher DMFT values than those with Group 3 and Group 4 frequencies.

Patients with Group 4 frequency of egg consumption were determined to have significantly higher DMFT values than those with Group 2 frequencies.

Patients with Group 2 frequency of honey and jam consumption were determined to have significantly higher DMFT values than those with Group 1 frequency.

Patients with Group 1 frequency of chocolate consumption were determined to have significantly higher DMFT values than those of all the other groups.

Table 2 Evaluation of sociodemographic characteristics and oral habits with oral hygiene

		Good		Medium		Bad		Total	*p* value
		n	%	*n*	%	*n*	%	*n*	
		140	**58,3%**	**76**	**31,7%**	**24**	**10,0%**	**240**	
Gender	female	92	60,9%	39	25,8%	20	13,2%	151	***0,01***
	male	48	53,9%	37	41,6%	4	4,5%	89	
Education	primary education[a]	43	60,6%	14	19,7%	14	19,7%	71	***0,01***
	high school[b]	53	63,1%	25	29,8%	6	7,1%	84	
	university[b]	44	51,8%	37	43,5%	4	4,7%	85	
Body mass index	healthy	75	61,0%	34	27,6%	14	11,4%	123	0,686
	fat	50	56,2%	32	36,0%	7	7,9%	89	
	obese	15	53,6%	10	35,7%	3	10,7%	28	
Smoking	no	120	58,8%	61	29,9%	23	11,3%	204	0,165
	yes	20	55,6%	15	41,7%	1	2,8%	36	
Brushing teeth	occasionally[a]	27	45,8%	21	35,6%	11	18,6%	59	***0,017***
	1 time per day[b]	44	55,0%	30	37,5%	6	7,5%	80	
	2 times a day[b]	69	68,3%	25	24,8%	7	6,9%	101	
Dental floss-interface brush	no	97	55,1%	61	34,7%	18	10,2%	176	0,215
	yes	43	67,2%	15	23,4%	6	9,4%	64	
Frequency of visits to Dentist	as long as there is a complaint	94	54,0%	58	33,3%	22	12,6%	174	0,136
	once a year	21	70,0%	8	26,7%	1	3,3%	30	
	once every six months	25	69,4%	10	27,8%	1	2,8%	36	

Table 3 Comparison of sociodemographic characteristics and oral habits with DMFT

		n	mean	±	std	t/F value	*P* value
Gender	female	151	10,34	±	5,78	1,120[t]	0,291
	male	89	11,13	±	5,38		
Education	primary education[a]	71	13,06	±	5,63	17,839[F]	***< 0,001***
	high school[a]	84	11,17	±	5,02		
	university[b]	85	8,08	±	5,22		
Body mass index	healthy	123	9,92	±	5,88	2,070[F]	0,128
	fat	89	11,45	±	5,45		
	obese	28	11,18	±	4,86		
Smoking	no	204	10,56	±	5,57	0,207[t]	0,65
	yes	36	11,03	±	6,10		
Brushing teeth	occasionally[a]	59	12,49	±	5,05	8,896[F]	***< 0,001***
	1 time per day[a]	80	11,38	±	5,38		
	2 times a day[b]	101	8,96	±	5,74		
Dental floss-interface brush	no	176	10,77	±	5,80	0,403[t]	0,526
	yes	64	10,25	±	5,19		
Frequency of visits to DT	as long as there is a complaint[a]	174	11,44	±	5,52	7,046[F]	***< 0,001***
	once a year[a]	30	8,97	±	5,56		
	once every six months[b]	36	8,11	±	5,37		

t: İndependent samples T test / **F**: One-way Anova

b: Difference with a < 0.05

Patients with Group 1 frequency of sticky food consumption were determined to have significantly higher DMFT values than those with Group 2 and Group 3 frequencies.

Patients with Group 1 frequency of acidic drinks consumption were determined to have significantly higher DMFT values than those with Group 2 frequency.

Discussion

Dental decay is one of the most commonly seen non-infectious diseases throughout the world in general, and is therefore accepted as a serious public health problem. According to the 2015 Global Burden of Disease study, dental decay affects 2.3 billion people worldwide. Problems in the permanent teeth are ranked first, and problems in deciduous dentition are ranked twelfth. Over-consumption of sugary foodstuffs, poor oral care practices, and insufficient healthcare service play a major role in the increase in dental caries. The prevalence of decay is higher especially in societies that are economically disadvantaged [25].

In the current study, there was seen to be a significant correlation between education level and the DMFT index values. The mean DMFT values of patients with university level education were lower than those of the patients with an education level of primary school. Other studies have similarly reported that the level of awareness increased and the DMFT value decreased together with an increased education level [26, 27]. It has also beeen reported that the number of filled teeth and number of visits to a dentist increased together with the level of education [28]. In another study, it was stated that more highly educated individuals had greater access to information about dental health and therefore, they had better oral hygiene practices [29].

In the current study, no significant difference was determined between those who used or did not use dental floss in respect of DMFT values. In a study by Koçak, there was reported to be no association between daily dental flossing and the DMFT index [30]. Another study also determined no significant association between the use of dental floss and rates of decay. Nevertheless, the use of dental floss is known to be useful in terms of general oral hygiene [31].

Protein-rich foods such as eggs, fish, red meat, chicken, and legumes are known to have karyostatic properties as they cannot be metabolised by micro-organisms [32]. A study that evaluated the relationship between a healthy diet and dental decay reported that individuals wth no dental decay had a diet with higher protein content but this was not statistically significant [33]. A similar study in China examined the relationship between dietary habits and dental decay in adolescents aged 12–15 years, and suggested that foods containing protein played a potential role in reducing the risk of dental decay. However, this effect was reported to be less significant compared to other foodstuffs. It was emphasized in that study that the general effect of diet on the development of caries was multifactorial [34]. In the current study, no significant difference was determined in the DMFT values according to the consumption frequency of pulses, whereas the DMFT values were found to be significantly lower in the patients who consumed red meat, chicken, and fish more often. Consumption of eggs once or twice

Table 4 Comparison of food consumption frequencies and DMFT index

		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6		
		once a month	**1–2 times a week**	**3–4 times a week**	**1–2 times a day**	**3–4 times a day**	**5–6 times a day**	**F value**	***P* value**
Bread	frequency	6	31	24	148	24	7		
	percentage	2,5%	12,9%	10,0%	61,7%	10,0%	2,9%		
	mean ± std	13,66 ± 4,59	8,61 ± 5,47	11,21 ± 5,18	10,92 ± 5,82	10,08 ± 5,48	10,86 ± 4,10	1,327	0,254
Rice/Pasta	frequency	12	118	73	32	5	0		
	percentage	5,0%	49,2%	30,4%	13,3%	2,1%	0,0%		
	mean ± std	14,50 ± 6,24	10,56 ± 5,63	10,52 ± 5,48	9,94 ± 5,73	9,20 ± 4,02		1,644	0,164
Fruit	frequency	8	45	52	126	9	0		
	percentage	3,3%	18,8%	21,7%	52,5%	3,8%	0,0%		
	mean ± std	8,50 ± 6,72	9,22 ± 5,06	9,61 ± 5,78	11,66 ± 5,55	11,11 ± 5,95		2,537	***0,041***
Vegetables	frequency	8	43	77[b]	99[a]	13	0		
	percentage	3,3%	17,9%	32,1%	41,3%	5,4%	0,0%		
	mean ± std	9,13 ± 3,68	10,77 ± 6,13	**9,08 ± 5,16**	**12,03 ± 5,77**	9,69 ± 4,35		3,352	***0,011***
Milk	frequency	96	73	41	30	0	0		
	percentage	40,0%	30,4%	17,1%	12,5%	0,0%	0,0%		
	mean ± std	10,86 ± 5,26	10,60 ± 6,07	9,88 ± 5,22	11 ± 6,40			0,339	0,797
Yoghurt	frequency	9	49[b]	75[b]	96[a]	11	0		
	percentage	3,8%	20,4%	31,3%	40,0%	4,6%	0,0%		
	mean ± std	13,22 ± 7,55	**8,12 ± 5,27**	**9,83 ± 5,27**	**12,33 ± 5,34**	10,36 ± 5,84		5,929	***< 0,001***
Cheese	frequency	16	33	52	132	7	0		
	percentage	6,7%	13,8%	21,7%	55,0%	2,9%	0,0%		
	mean ± std	8,63 ± 6,14	9,18 ± 5,76	9,50 ± 4,88	11,64 ± 5,75	11,57 ± 3,87		2,751	***0,029***
Meat/Chicken/ Fish	frequency	12[a]	111[b]	80[b]	30	7	0		
	percentage	5,0%	46,3%	33,3%	12,5%	2,9%	0,0%		
	mean ± std	**15,50 ± 4,83**	**10,46 ± 5,59**	**10,08 ± 5,28**	11,07 ± 5,88	9,57 ± 7,79		2,635	***0,035***
Eggs	frequency	18	71[b]	63	88[a]	0	0		
	percentage	7,5%	29,6%	26,3%	36,7%	0,0%	0,0%		
	mean ± std	11,50 ± 6,96	**9,54 ± 5,12**	9,83 ± 5,90	**11,92 ± 5,35**			3,078	***0,028***
Legumes	frequency	20	111	76	27	6	0		
	percentage	8,3%	46,3%	31,7%	11,3%	2,5%	0,0%		
	mean ± std	10,40 ± 6,34	10,59 ± 5,67	10,80 ± 5,35	10,26 ± 5,85	11,83 ± 6,97		0,124	0,974
Honey/Jam	frequency	47[b]	68	43	82[a]	0	0		
	percentage	19,6%	28,3%	17,9%	34,2%	0,0%	0,0%		
	mean ± std	**8,40 ± 5,46**	10,75 ± 5,71	9,86 ± 5,16	**12,22 ± 5,51**			5,147	***0,002***
Chocolate/ Sugar	frequency	47[a]	72[b]	53[b]	56[b]	6[b]	6[b]		
	percentage	19,6%	30,0%	22,1%	23,3%	2,5%	2,5%		
	mean ± std	**14,34 ± 5,12**	9,86 ± 5,54	9,96 ± 5,02	9,64 ± 5,72	10 ± 4,20	6,67 ± 5,50	6,010	***< 0,001***
Glutens/ Caramel foods	frequency	87[a]	86[b]	27[b]	31	9	0		
	percentage	36,3%	35,8%	11,3%	12,9%	3,8%	0,0%		
	mean ± std	**12,55 ± 5,86**	**9,41 ± 5,23**	**8,96 ± 6,17**	10,35 ± 4,52	9,78 ± 4,74		4,441	***0,002***
Acidic drinks	frequency	132	62	23	16	7	0		
	percentage	55,0%	25,8%	9,6%	6,7%	2,9%	0,0%		
	mean ± std	11,52 ± 5,66	8,85 ± 5,02	10 ± 6,11	12,56 ± 5,89	7,29 ± 3,50		3,680	***0,006***
Tea/Coffee	frequency	5	7	10	146	45	27		
	percentage	2,1%	2,9%	4,2%	60,8%	18,8%	11,3%		
	mean ± std	10,60 ± 6,80	5,71 ± 3,20	6,40 ± 3,86	11,19 ± 5,61	11 ± 5,61	9,89 ± 5,71	2,698	***0,022***

F: One-way Anova

a day was found to be associated with a higher DMFT score. Therefore, the preventative effect of protein against decay should be evaluated together with other habits and factors.

The high rate of calcium, phosphate, and protein contained in milk and other dairy products (yoghourt, cheese) supports the process of remineralisation. They also demonstrate an anti-karyogenic property by

neutralising plaque acidity. In a study by Giugliano et al., higher DMFT values were determined in students who did not consume milk and dairy products [35]. Tanaka et al. reported a relationship between yoghourt consumption and low dental decay prevalence, but no such association was found for milk and cheese [36]. In the current study, no difference was found in the DMFT index according to milk consumption frequency. In the National Health and Nutrition Survey of South Korea, it was seen that milk consumption increased the risk of dental decay in females, but this relationship was not statistically significant in males [37]. While the anti-karyogenic effect may be more significant in fermented dairy products such as yoghourt because of the probiotic effects, this effect has not been found to be statistically significant for milk and cheese in some studies. This can be attributed to the different processing methods and biochemical properties of dairy products [38]. In this study, low-frequency consumption of yogurt (once a month) was found to be associated with high DMFT.

By converting to sugar in the mouth, sources of carbohydrate, such as bread, rice, and pasta, lay the ground for fermentation which can lead to dental decay. However, these foodstuffs generally contain complex carbohydrates which are digested more slowly than simple sugars. As these have a low glycemic index and do not create a long-term acidic environment in the mouth, the DMFT index values are similar [38]. Foods such as wholewheat bread and pulses that require chewing increase the production of saliva [34, 39]. By neutralising acids in the mouth, saliva provides protection against dental decay. That the DMFT values are similar for these foods could show that the effects of these foods that cause decay are balanced by saliva.

In a study conducted among children and adolescents, it was observed that they experienced low dental caries and that frequent consumption of snacks such as fruit/vegetable consumption reduced their caries experience [40]. In the current study, no difference was observed between the groups in terms of fruit consumption frequency. This result suggests that it may be balanced by a wide range of bioactive health-promoting nutrients, antioxidants, fiber and phytochemicals found in fruits/vegetables that can reduce inflammation and improve endothelial function [41]. More frequent intake of vegetables was associated with higher DMFT. This may be due to differences in vegetable preparation and differences in oral hygiene.

Therefore, a balanced diet can generally have a protective effect against decay. When all these foodstuffs are consumed in the right combinations, they can balance each other in respect of oral health. For example, the consumption of complex carbohydrates and dairy products together can balance the acidic environment of the mouth.

In addition, the frequency of sugar intake is an important factor in the development of dental decay. As the pH of the dental biofilm remains low for a long time after sugar consumption, the risk of decay is increased [42]. In a study of adults in Finland, a correlation was found between DMFT and the amount of sugar consumed, but no relationship was observed with the frequency of sugar consumption [43]. In another cross-sectional study, a relationship was found between sugary drinks and dental decay, but after multivariate adjustment, no relationship was found between decay and food and liquid consumption patterns [44]. A study in Iran examined the relationship between acidic drinks consumption and dental health. Although the DMFT was determined to be higher than for other groups, this relationship was not determined to be statistically significant. This demonstrated that there is not always an evident effect of acidic drinks consumption on the development of dental decay.

In the current study, the effects of various factors such as education level, dietary habits, and dental hygiene on DMFT values were examined and significant relationships were determined between these factors [45]. However, the fact that the DMFT values were lower than expected in individuals who consumed foods with high sugar content, sticky foods, and acidic drinks, showed that effective oral hygiene practices play a critical role in the development of decay.

The accuracy of the results may have been affected by the inability of the participants to correctly recall dietary habits. Remembering the diet for a single day may not fully reflect the actual diet of an individual, and therefore, the data may be incomplete or misleading. The inclusion of individuals with recall of the diet for a single day may have decreased the sensitivity of the measurement of the dietary exposure and limits the generalisation of the results.

Another limitation of our study is that we did not evaluate the sociodemographic status, although sociodemographic data (income status, mother's education, father's education, etc.) is an important factor affecting eating habits.

As this was a cross-sectional study, it was not possible to evaluate the reasons for the relationship between dietary patterns and dental decay. There is a need for further long-term, longitudnal studies to reveal the effects of age, period, and the cohort.

This study evaluated the effects of dietary habits, tooth brushing frequency, visits to a dentist, and BMI on the risk of dental decay. The findings showed that patients with a higher level of education had lower DMFT index values and that better oral hygiene habits reduced the development of dental decay. A statistically significant

correlation was determined between a low DMFT index value and tooth brushing once or twice a day.

The effect of diet on dental decay was evaluated and a lower risk of decay was seen to be related to the consumption of protein-rich foods and fermented dairy products. Although the consumption of high sugar and sticky foods increased the risk of dental decay, these effects can be balanced by effective oral hygiene habits. Therefore, healthy eating habits and regular dental care play a critical role in preventing dental decay.

In conclusion, improving dietary habits, paying attention to oral hygiene, and promoting regular visits to the dentist are important to decrease the risk of dental decay. Improving levels of education, and developing awareness of dental health and acquiring good hygiene habits with public health campaigns may be effective in reducing the prevalence of dental decay in the general population.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12889-025-22080-0.

Supplementary Material 1

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Author contributions
RZE and FB contributed to the design of the study, conducted the research, and performed data analysis. RZE was responsible for drafting the manuscript, revising and finalizing the manuscript.

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Data availability
The dataset used and/or analysed during the study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
This study was approved by the Afyonkarahisar Health Sciences University Non-Interventional Clinical Research Ethics Committee, which belongs to Afyonkarahisar Health Sciences University (Decision Date: 15.12.2023, Decision No: 2023-13). Informed consent was obtained from all participants.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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