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Evaluation of the Association Between Sociodemographic Characteristics, Systemic Diseases and Oral Health in the Turkish Suppopulation: A Cross-Sectional Study

Sultan Aktuğ Karademir, Eda Karaaslan, Samet Atasoy

Ordu University, Faculty of Dentistry, Department of Restorative Dentistry, Ordu, Türkiye.

Correspondence Author: Sultan Aktuğ Karademir
E-mail: Sultan_721@hotmail.com

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ABSTRACT

Objective: This study aimed to evaluate the relationship between sociodemographic characteristics and systemic diseases with oral health in individuals aged 18-65 with the decayed, missing, filled teeth (DMFT) index.

Methods: This cross-sectional study included 367 volunteers aged 18-65 years. The sixty seven people who reported that they ate completely sugar-free and received orthodontic treatment were excluded from the study and 300 people (170 female/130 male; average age:38.64±14.19) were evaluated. The patients' sociodemographic information (age, gender, education, brushing), systemic diseases, medication use and DMFT scores were recorded by the specialist researcher. Data were analyzed by using Kolmogorov Smirnov, Man Whitney-U, Kruskall Wallis test and Post-hoc Tamhane's T2 test in SPPS software (22.0).

Results: The difference in DMFT score with sociodemographic information (age, education, brushing) other than gender was statistically significant ($p< .05$). DMFT score was found in asthma (12.39±5.17), cardiovascular disease (14.56±7.23) and diabetes (14.00±3.42); was significantly higher compared to healthy (9.39±3.67) people ($p< .05$). The difference between gastrointestinal disease, thyroid disease, kidney disease and healthy people wasn't statistically significant ($p> .05$). However the mean DMFT score in kidney patients (9.00±2.85) was significantly lower compared to asthma, diabetes and cardiovascular disease ($p< .05$). DMFT score was significantly higher in people using medication (13.77±5.58) than in people not using medication (9.42±3.70)($p< .05$).

Conclusion: Oral health may be negatively affected by some systemic diseases and drug use. In addition, sociodemographic characteristics have an important effect on oral health. The individual's sociodemographic characteristics, systemic diseases and medication use should be evaluated in detail in treatment planning and oral health motivation.

Keywords: DMFT index, general health, systemic diseases, oral health

1. INTRODUCTION

Systemic diseases are important in dental practice because they allow dentists to take precautions for the current general health condition or before the disease occurs (1). Knowing the incidence of systemic diseases and the systemic and oral findings related to these diseases allows reducing the problems and risks that may develop during and after dental treatment (2,3).

Oral health is defined as the absence of any disease of the craniofacial complex, which includes the mouth, teeth and skull tissues. In the oral health report of the American General Health Association in 2000, it was emphasized that oral health is not just about good teeth and should be examined as a component of general health, and a connection was established between dental health and general health (4,5). Oral health and general health share similar risk factors (6). In addition to various oral symptoms of systemic diseases, current oral health is also related to the general health of the individual (7). Poor oral health can affect overall health in the long term. For this reason, in dentistry, it is necessary to evaluate individuals more comprehensively in terms of their general health status, the course of their disease, if any, the medications they use and other variables that may affect the treatment process (8).

The World Health Organization has reported that collecting epidemiological data on dental health and diseases is of primary importance (9). Dental caries, one of the most common infectious diseases worldwide, is one of the most common causes of deterioration in oral health (10). Their etiology is multifactorial, including socio-demographic data such as age, gender, education, smoking and oral hygiene practices (11). Epidemiological studies on caries use the decayed, missing and filled teeth (DMFT) index as a marker of the cumulative outcome of caries in permanent teeth (12). The DMFT index collects data on decayed, missing and filled

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teeth. In calculating the DMFt index in individuals under 30 years of age, teeth coded as missing due to caries are taken as basis, while in individuals over 30 years of age, teeth coded as missing due to both caries and other reasons are taken as basis. In this index, all permanent teeth are evaluated, but teeth with abutments, crowns, implants and fissure sealants are not evaluated (13).

Although untreated dental caries has a direct impact on oral health and associated quality of life, identifying indirect relationships between dental caries and systemic health has received little attention (14). The ability of oral microbiota to spread from dental caries to the systemic circulation is plausible. In dental caries, involvement of the root canal space or marginal periodontium is the most likely route for direct systemic dissemination of oral microbiota(15). Inflammation of oral tissues and the contribution of microbiota to diseases such as atherosclerosis, hypertension, diabetes, rheumatoid arthritis, lung diseases, and the relationship between periodontitis and systemic diseases have been further studied (16-18). In addition, while studies focus on children on the relationship between oral health status and systemic diseases, studies on the adult population are limited (19,20). This study aimed to evaluate the relationship between sociodemographic characteristics and systemic diseases with oral health in individuals aged 18-65 with the decayed, missing, filled teeth (DMFT) index.

2. METHODS

This study was approved by Clinical Research Ethics Committee of Ordu University (2022-270) and all procedures in the study were carried out in accordance with the principles of the Declaration of Helsinki. The minimum sample size was calculated in G Power 3.1.9.2 software for 0.85 power, 0.40 effect size and 300 participants were found sufficient. This cross-sectional study included 367 volunteers aged 18-65 (average:38.64±14.19) who applied to the Restorative Dental Treatment Department of Ordu University Faculty of Dentistry between January 2023 and July 2023. All participants were given necessary information about the study, and they signed consent forms stating that they agreed to participate in the study. A survey was applied to the participants, including sociodemographic information (age, gender, education level, brushing frequency), nutritional status, systemic diseases and medication use information. Sociodemographic characteristics were categorized as age range 18-34, 35-49 and 50-65, education level as primary school, high school, university and doctorate, and brushing frequency as once a day, twice a day and irregular brushing. Systemic disease status was categorized as healthy, asthma, diabetes, cardiovascular system disorder, gastrointestinal system disorder, thyroid disorder, kidney diseases. Individuals with more than one systemic disease were excluded from the study. A sugary food consumption frequency survey was applied to standardize nutritional status. According to the frequency of sugary food consumption; 1-2 times a day (5 points), 4-5 times a week (4 points), 3 times a week (3 points), 1-2 times a week (2 points), 1-2 times a month (1 point) and sugar-free diet (0 points) was scored as. While participants in the common score range were included in the study, 67 participants who received orthodontic treatment and reported that they ate completely sugar-free were excluded from the evaluation and 300 people were included in the study.

Participants were examined visually and radiographically using a panoramic radiograph by a researcher experienced in the field of restorative dentistry. The DMFT index was used to determine the oral health status of the participants and the number of decayed (D), missing (M), and filled (F) teeth were recorded and the total DMFT score was obtained.

2.1. Statistical Analysis

The obtained data were analyzed in SPSS (version 22.0) software. The suitability of the data for normal distribution was determined by the Kolmogorov Smirnov and Shapiro Wilk test, and the homogeneity of variances was determined by the Levene test. Analysis of normally distributed data was done with One Way Anova, and analysis of non-normally distributed data was done with Man Whitney U and Kruskall Wallis tests. Post-hoc Tamhane T2 test was used for pairwise comparison of groups. The findings were evaluated at the α= .05 significance level.

3. RESULTS

This study was conducted in a total of 300 patients. 41.3% of the patients were between the ages of 18-34, 33.7% were between the ages of 35-49, and 25% were between the ages of 50-65. The relationship between age-related DMFT score was found to be statistically significant ($p< .001$). The average DMFT score in the 50-65 age range was found to be (13.27±5.75), and this average was significantly higher than the 18-34 age range (8.56±3.47) ($p< .05$). There was no significant difference between the ages of 35-49 (12.26±4.05) ($p>.05$).

When gender-related findings were examined, 43.3% of the participants were men and 56.7% were women. There was no significant difference between the DMFT score averages in women (11.33±5.12) and men (10.53±4.64) ($p> .05$).

The education level of the participants included 33% primary school, 32.7% high school, 32% university and 2,3% doctoral degree. The difference between education levels and DMFT score averages was statistically significant ($p< .05$). DMFT average score of participants whose education level is primary school is (12.39±5.59); the education level was significantly higher than that of individuals with high school (10.45±4.44), university (10.31±4.47) and master's/doctoral degree (7.71±2.43) ($p< .05$). There was no significant difference in DMFT score averages between high school, university and master's and doctoral education levels ($p> .05$).

When the tooth brushing habits of the participants were evaluated, 50% reported that they brushed twice a day, 32.7%

reported that they brushed once a day, and 17.3% reported that they brushed irregularly. There was a statistically significant difference between brushing frequencies and DMFT score averages (p< .05). While there was no significant difference between brushing once a day (11.08±4.68) and brushing twice a day (9.82±4.29), irregular tooth brushing (14.15±5.71) significantly increased the DMFT score (p< .05).

Distribution on individuals' systemic diseases are listed in figure 1. In the presence of asthma (12.39±5.17), diabetes (14.00±3.42) and cardiovascular system disease (14.56±7.23), the DMFT score was significantly higher than in healthy individuals (9.39±3.67) was high (p<.05). There was no significant difference in the mean DMFT score compared to healthy individuals in gastrointestinal system disease (13.60±5.77), thyroid disorder (9.90±4.02) and kidney disease (9.00±2.85). However, the mean DMFT score in kidney patients was significantly lower compared to asthma, diabetes and cardiovascular system disease (p<.05). DMFT distributions of individuals according to systemic diseases are summarized in figure 2.

When the medication use information of the participants was examined, 36% reported that they used medication and 64% reported that they did not use any medication. A significant increase was observed in the mean DMFT score due to medication use (13.77±5.58) compared to those not using medication (9.42±3.70). Data regarding the criteria evaluated in the study are summarized in Table 1.

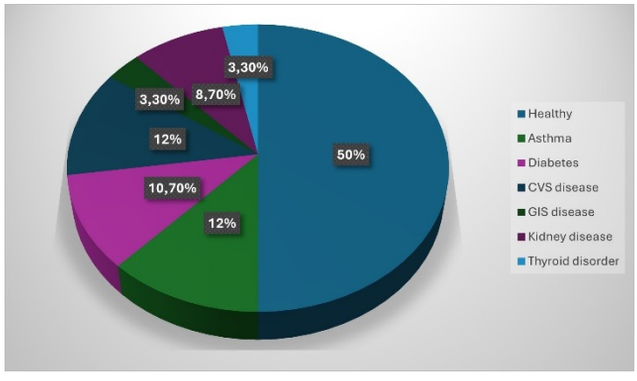

Figure 1. *Systemic disease distribution of participants*

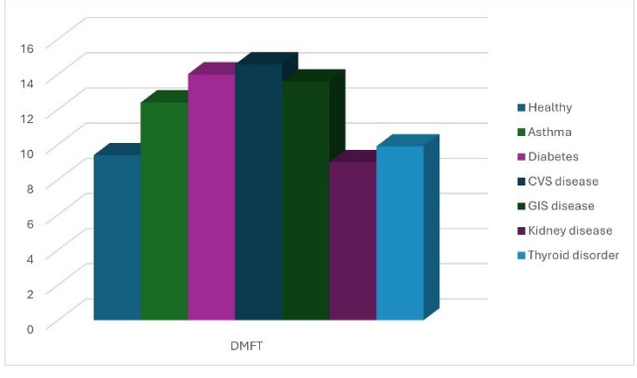

Figure 2. *DMFT distributions of participants due to systemic disease*

Table 1. *Comparison of groups in terms of sociodemographics, brushing habits, systemic diseases and medication use*

Parameters		n	DMFT Mean(±SD)	p value
Age	18-34	124	8.56 (±3.47)^{A}	p<.001*
	35-49	101	12.26 (±4.05)^{B}	
	50-65	75	13.27 (±5.75)^{BC}	
Sex	Female	170	11.33 (±5.12)	p=.191
	Male	130	10.53 (±4.64)	
Education	Primary school	99	12.39 (±5.59)^{A}	p=.009*
	High school	98	10.45 (±4.44)^{B}	
	University	96	10.31 (±4.47)^{B}	
	Doctorate	7	7.71 (±2.43)^{B}	
Brushing	One	98	11.08 (±4.68)^{A}	p<.001*
	Two	150	9.82 (±4.29)^{A}	
	Irregular	52	14.15 (±5.71)^{B}	
Systemic disease	Healthy	150	9.39 (±3.67)^{A}	p<.001*
	Astma	36	12.39 (±5.17)^{B}	
	Diabetes	32	14.00 (±3.42)^{BC}	
	CVS disorder	36	14.56 (±7.23)^{BC}	
	GIS disorder	10	13.60 (±5.77)^{AB}	
	Thyroid disorder	10	9.90 (±4.02)^{AB}	
	Kidney diseases	26	9.00 (±2.85)^{A}	
Medication	Yes	108	13.77 (±5.58)	p<.001*
	No	192	9.42 (±3.70)	

DMFT: Total of decay,missing and filling teeth, CVS: Cardiovascular system GIS: Gastrointestinal system
*For each variable section; Mean with different letters in the same column indicate statistically significant difference, *: significant (p < .05).*

4. DISCUSSION

Comprehensive evaluation of the factors affecting the individual's oral health status in treatment planning and oral hygiene motivation sheds light on clinicians in terms of precautions that can be taken against possible complications and treatment plans for the individual. Therefore, the current study evaluated how the individual's oral health status was affected by sociodemographic characteristics, systemic diseases and medication use. An individual's oral health status is affected by many factors such as age, gender, nutrition, educational status, brushing habits, and the individual's chronic systemic diseases and medication use (21). It has been reported in many studies in the literature that DMFT scores increase with increasing age in adults (22,23). Consistent with previous studies, a significant increase in the DMFT score was observed in the 50-65 age range in this study (p< .05). Although the length of time a tooth remains in the mouth is an important factor in exposure to caries, it has been reported that the incidence of caries decreases as we age. Aging of the tooth enamel with increasing age and the disappearance of retaining areas as a result of wear on the teeth are factors that contribute to the inverse relationship between age and caries (1). In addition, it is known that tooth

loss due to periodontal diseases increases with increasing age (18). In this study, we think that the number of missing teeth and weakened oral skills are effective in the increase in DMFT score with increasing age.

Previous studies have reported that oral health indicators are worse in women and oral health-related quality of life (OHRQoL) is more likely to be poor in women (24,25). Unlike these studies, there was no significant difference in the mean DMFT score between men and women in this study, although the mean DMFT score was relatively higher in women than in men. The differences in the results may be due to differences in the population studied.

The most commonly used socioeconomic indicators of social health inequalities are education, income, carieer and social class. The relatively more constant of these determinants is the level of education (26). For this reason, we used educational status as a socioeconomic determinant in the study. Education level can affect the way a person interacts with oral health services and uses information (27). In the results of this study, the mean DMFT score was significantly higher at lower education levels. The results are consistent with systematic reviews concluding that low socioeconomic status is associated with increased dental caries experience (28,29). Tsakos et al. In their study, they used the OHIP-14 index to determine oral health status and found that individuals with higher education had lower OHIP-14 scores, indicating a better oral health status (30). Although oral health status was evaluated with a different index than this study, the results indirectly support the results of this study.

It has been reported that tooth brushing habits contribute significantly to reducing the prevalence of dental caries (31,32). 50% of the participants in this study reported that they brushed their teeth twice, 32.7% reported that they brushed their teeth once a day, and 17% reported that they brushed their teeth irregularly. DMFT score was significantly higher in participants who brushed their teeth irregularly. Brushing teeth once a day and twice a day did not cause a significant difference in DMFT score. Similar to the results of this study, Farooqi et al., Schwarz et al. Mallineni et al. In their study, irregular tooth brushing significantly increased the prevalence of tooth decay (31-33). These results reveal that tooth brushing habits are one of the important factors that can affect oral health.

In this study, 12% of the participants had asthma, and there was a significant increase in the DMFT score, which is a measure of oral health status, in asthma patients compared to healthy individuals. In the study of Elyassi Gorji N et al., a significant increase in DMFT score was found, consistent with the results of this study (34). Although the nature of the association of asthma with dental caries appears unclear, previous studies have shown genetic variation in ameloblastin in asthma patients (35), an association between higher rates of dental caries in the tablet form of asthma medications (36) and inhaled corticosteroids (37), and increased numbers of Veilonella in asthma patients that can metabolize lactate produced by cariogenic streptococci (38). These results support the increased DMFT score in asthma patients.

In this study, 10.7% of the participants were diabetic patients, and the DMFT score was significantly higher in diabetic patients compared to healthy individuals. A study in caries-active diabetics reported that salivary calcium was significantly reduced and alkaline phosphatase was increased (39). Another similar study found that salivary pH decreased significantly and the number of lactobacilli increased in children with diabetes (40). Again, in a study conducted on rodents, hyperglycemia was shown to be associated with increased tooth decay (41). Additionally, increased alveolar bone loss and periodontitis in diabetics are factors that negatively affect oral health status (42). All of these support the increased DMFT score in diabetics and is an expected result.

In this study, hypertension, heart valve diseases, congenital heart diseases and the presence of a pacemaker were included in the cardiovascular diseases category. 12% of the participants had cardiovascular system disease and there was a significant increase in DMFT score compared to healthy individuals. In the study of Soto Barreras et al. in which they evaluated cardiovascular disease, dental caries experience and periodontal status, dental caries were not found to be significantly different compared to controls, but it was reported that the overall oral inflammatory burden increased due to the increase in periodontal problems (43). In another study, Ostalska-Nowicka et al. found a relationship between dental caries and primary hypertension (44).

The rate of participants with kidney disease was 8.7%. In the study, patients with chronic kidney failure, polycystic kidney disease and kidney stones were included in the kidney disease category. While the mean DMFT score was significantly lower in the presence of kidney disease compared to asthma, diabetes and cardiovascular disease, there was no difference with healthy individuals. Consistent with the results of this study, DMFT scores were found to be lower in patients with renal failure in the studies of Andolora et al. (45) and Ertuğrul et al. (46). Again, in the studies of Silva et al. (47), it was reported that the prevalence of dental caries in chronic kidney disease was significantly lower. These results may be caused by the presence of large amounts of urea in saliva and inhibition of plaque development in chronic kidney diseases (48).

Previous studies have reported that many medictions used for chronic systemic disease cause dry mouth and are associated with increased prevalence of dental caries (49,50). In this study, DMFT score related to medication use showed a positive correlation.

One of the limitations of this study is that the sample size is small and the data includes self-reported information, which is the most commonly used method. Another limitation is that oral health status was assessed only with the DMFT index, and periodontal status such as gingival bleeding index and plaque index were not assessed. Studies with larger sample sizes and studies that evaluate oral health status with other indices are needed to support the accuracy of the results.

5. CONCLUSION

Within the limitations of this study, it can be concluded that the DMFT index, which we use to evaluate the oral health status of the individual, is affected by many factors such as sociodemographic factors, systemic diseases and medication use. Informing patients about the risk factors that may affect oral health, oral findings of existing systemic diseases, or prevention-oriented national health projects aimed at the effect and relationship of the current oral condition on general health will provide benefits for the future.

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