The Association Of Sociodemographic, Medical And Cognitive Factors On Periodontal Health Status Of A Geriatric Population In Turkey

Sosyodemografik, Medikal ve Kognitif Faktörlerin Bir Türk Geriatrik Popülasyonunun Periodontal Sağlık Durumuyla İlişkisi

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Abstract

Objective: The longevity of life brings oral health issues, which should be managed in order to improve the quality of life. It is necessary to determine the oral health condition and its determinants for geriatric individuals. The aim of this study was to investigate the sociodemographic, anthropometric, medical, and dental factors and cognitive status regarding their effects on, or associations with, "having periodontitis or not" in a geriatric population.

Material-Method: The sample comprised 200 older adults who applied to the Süleyman Demirel University, Faculty of Dentistry, between April 2017 and December 2018. Periodontal parameters (plaque index (PI), bleeding on probing, clinical attachment loss and probing depth) were measured and periodontal inflamed surface area (PISA) was calculated, anthropometric, and sociodemographic parameters, and cognitive status (Schulman score) were recorded.

Results: The percentage of geriatric patients having periodontitis was 58%. The cognitive status determined as minor visuospatial disorganization (2.69±1.34). The Schulman score was correlated negatively by the number of teeth (rho=-0.154, p=0.036), and with PI scores (rho=0.076, p=0.04). Due to the logistic regression analysis, lower education level, decreased number of teeth, and decreased salivary flow rate presented odds ratios (12.3, 1.18, and 3.944, respectively), and found associated with having periodontitis.

Conclusion: Cognitive dysfunction results in decreased plaque removal efficacy; and education level, number of teeth, salivary flow rate and periodontal parameters have presented association with having periodontitis in this population.

Keywords: Cognitive Dysfunction, Elderly, Oral Health, Periodontitis.

Özet

Amaç: Yaşamın süresinin uzaması, yaşam kalitesini artırmak için yönetilmesi gereken ağız sağlığı sorunlarını da beraberinde getirir. Bu bağlamda geriatrik bireyler için ağız sağlığı durumunu ve belirleyicilerini tanımlamak gereklidir. Bu çalışmanın amacı, geriatrik bir popülasyonda sosyodemografik, antropometrik, tıbbi ve dental faktörlerin ve bilişsel durumun, geriatrik popülasyondaki "periodontitis varlığı" ile ilişkisinin araştırılmasıdır.

Materyal-Metot: Örneklem Nisan 2017-Aralık 2018 tarihleri arasında Süleyman Demirel Üniversitesi Diş Hekimliği Fakültesi'ne başvuran 200 yaşlı bireyden oluşturuldu. Periodontal parametreler (plak indeksi (Pİ), sondlamada kanama, klinik ataçman kaybı ve sondlamada cep derinliği, periodontal iltihaplı yüzey alanı (PİYA)) ile antropometrik, sosyodemografik parametreler ve bilişsel durum (Schulman skoru) kaydedildi.

Bulgular: Periodontitisi olan geriatrik bireyler çalışma popülasyonunun %58'ini oluşturmaktaydı. Bilişsel durum minör görsel-uzamsal düzensizlik olarak belirlendi (2,69±1,34). Schulman skoru ile diş sayısı (rho=-0,154, p=0,036) ve PI skorları ile (rho=0,076, p=0,04) negatif korelasyon gösterdi. Lojistik regresyon analizi sonucunda, düşük eğitim düzeyi, azalmış diş sayısı ve azalmış tükürük akış hızı odds oranları (sırasıyla 12,3, 1,18 ve 3,944) göz önüne alınarak periodontitis ile ilişkili bulunmuştur.

Sonuç: Çalışmamızda değerlendirilen bu popülasyonda bilişsel işlev bozukluğu plak giderim etkinliğinin azalmasına neden olmuştur. Eğitim düzeyi, diş sayısı, tükürük akış hızı ve periodontal parametrelerin periodontitis varlığı ile ilişkili olduğu görülmüştür.

Anahtar kelimeler: Bilişsel İşlev Bozukluğu, Yaşlı, Ağız Sağlığı, Periodontitis.

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Introduction

The expected human lifespan in Turkey has increased (currently reported to be 78); and the percentage of the older population has been reported to be 8.2% of the whole population of our country (1). Similar to our country, an increase in the life expectancy and number of older persons in the whole population has been reported globally (2). The geriatric population is expected to be twice as high in 2050, and probably having more teeth in the dentition in their old age (3).

In the studies that have evaluated the older adults' population in different countries, it was found that the decayed, missed, filled teeth (DMFT) index was 22.2–30.2 (4); the percentage of edentulousness and the prevalence of periodontal disease increased with age (5). There are few studies that have evaluated oral and periodontal health, and the treatment need of the older people in Turkey (6-12). Unfortunately, to the best of our knowledge, no contemporary national survey evaluating this population has been conducted to determine the oral health profile in Turkey since 2004. In the study by Gökalp et al. (12), a sample consisting of 3,176 individuals evaluated, including older individuals as well as other age groups. All of the above studies conducted in Turkey have reported poor oral health and have marked the need for a comprehensive preventive oral and periodontal health program for the elder individuals.

The aim of this study is to determine the oral and periodontal health of a geriatric population living in Southern Turkey and to test the hypothesis that the investigated sociodemographic and anthropometric characteristics, and also the medical and cognitive status could affect the periodontal health, and specifically the periodontal disease presence (having periodontitis or not) of this population.

Material and Methods

Ethical Considerations

This study was approved by the Süleyman Demirel University (SDU) Local Ethical Committee on Clinical Investigations (Date: 13/04/2017, Decision number: 68); it was conducted in accordance with the ethical standards laid down in the Declaration of Helsinki (as revised in 2013).

Study Population

The study population comprised voluntary patients who underwent a dental examination in the SDU, Faculty of Dentistry, Clinic of Geriatrics between April 2017 and December 2018 and met the inclusion criteria for participation in the study. The informed consent forms were signed by all of the patients.

Inclusion and Exclusion Criteria

Individuals ≥65 years old and who did not meet the below-mentioned characteristics have participated in the study. Individuals received periodontal treatment in the last six months, received antibiotic and/or anti-inflammatory drugs in the last three months, having acute periodontal diseases, being edentulous, having rheumatologic and/or autoimmune diseases, or malignancies, were excluded from the study.

The study population's sociodemographic characteristics (gender, education level, monthly income, living conditions (property), marital status, number of children, and presence of health insurance) were recorded. Anthropometric measurements (weight, height, waist and hip size) were also recorded.

Detailed medical and dental anamneses of the patients were also obtained. The systolic and diastolic pressures, and the presence and distribution of one or more systemic diseases were recorded.

Dental and Periodontal Parameters

The dental and periodontal examinations were made by the same examiner (ARI) who was qualified before the study. The assessment of the measurement consistency (intraclass correlation coefficient (ICC), 0.993 for probing depth (PD), and 0.996 for clinical attachment loss (AL) between visits indicated no systematic bias in the measurements.

The plaque index (PI, (13)); the bleeding on probing (BOP, (14), AL and PD were recorded. The periodontal inflamed surface area (PISA) and periodontal epithelial surface area (PESA) scores were calculated (15). The diagnosis of the periodontal diseases was made (16), and the severity (mild, moderate or severe) of the present periodontal disease was also evaluated (17).

Cognitive Status Evaluation

The cognitive evaluation was made using the Shulman clock-drawing test score (18). The patients were asked to draw distinguishable numerals and clock hands and to insert them at a precise position (18). Illiterate patients were not asked to apply the test. Besides these illiterate patients, some of the patients refused to apply the test (n=15). The analysis of the data was conducted using the existing data for this variable.

Statistical Analysis

The Kolmogorov-Smirnov test was used to assess whether the distribution of the data was normal; the Levene test was used to assess whether the homogeneity of the variance was provided as a prerequisite. In cases where there was no normal distribution or a prerequisite for the homogeneity of variance was not provided, data were analyzed using nonparametric tests (the Kruskal-Wallis test in group comparison, the chi-square test in the case of categorical data, and the Spearman correlation test to determine the correlations between the parameters). When the preconditions were provided, Tukey's test was used to determine the differences between the variance analysis techniques and the group averages. The Kruskal-Wallis test was used in the comparisons between the categories in the study group. The Bonferroni-Dunn test was used to evaluate the difference between the groups and a p-value of 0.05 was determined to be statistically significant. For multivariate analysis, the possible factors (sociodemographic, anthropometric, medical and dental factors and cognitive status) were entered into the logistic regression analyzes to determine the independent predictors of periodontal status (having periodontitis or not). The analyzes were performed using a commercial statistical analysis program (SPSS®, 23, USA.).

Results

A total of 3,957 patients applied to the SDU, Faculty of Dentistry, Clinic of Geriatrics between April 2017 and December 2018. The dental and periodontal examinations made only by ARI numbered 437. The data obtained from voluntary participants fulfilling the inclusion criteria accounted for 200 of these.

Table 1. Sociodemographic characteristics of the study population (N=200)

Parameters	Groups	n	%
Gender	Female	92	46
	Male	108	54
Education level	İlliterate	28	14
	Elementary	105	52.5
	Secondary	21	10.50
	Higher	46	23
Monthly income	≤1500 TL	101	50.5
	1500 TL≤	99	49.5
Property	Homeholder	15	7.5
	Leaseholder	185	92.5
Marital status	Single/widow	44	22.0
	Married	156	78.0
Number of child / children	0	5	2.5
	1-3	148	74
	4-6	44	22
	7-9	3	1.5
Living condition	Alone	32	16.0
	With family	168	84.0

TL: Turkish Lira, 1 USA Dollar was between 3.66 and 5.24 TL; and the 1500 TL was the minimum wage during the time period in this the present study was conducted.

Table 2. The medical and anthropometric characteristics and cognitive status of the study population

Parameters			n	%
Systemic disease	Present		128	68.5
	Absent		72	31.5
Systemic diseases	DM		13	6.5
	CVD		82	41
	DM&CVD		33	16.67
BMI	Min-max	19.81-40.25		
	Mean±SD	28.68±3.85		
W/H	Min-max	0.66-9.70		
		1.39±6.79		
Systolic / Diastolic blood pressure (mmHg)	Min-max	90/60-200/100		
	Mean±SD	129.15/79.25±15.23/8.20		
Schulman Scores (n=185)	Min-max	1-6		
	Mean±SD	2.69±1.34		

BMI: body mass index; CVD: cardiovascular disease; DM: Diabetes Mellitus; SD: standard deviation; W/H: waist to hip ratio.

Table 3. The dental characteristics of the study population

Parameters (n)	Categorization / mean±SD	n	%
Tooth brushing frequency (200)	Rarely	53	26.50
	2-3 times a week	41	20.50
	Every day	106	53.0
Periodontal status (200)	Gingivitis	84	42.0
	Periodontitis	116	58.0
Classification of periodontal health	Gingivitis	84	42.0
	Periodontitis (Stage 1)	0	0
	Periodontitis (Stage 2)	0	0
	Periodontitis (Stage 3)	105	90.52
	Periodontitis (Stage 4)	11	9.48
	Grade A	1	0.86
	Grade B	115	99.14
	Grade C	0	0
Severity of periodontitis (116)	Mild periodontitis	72	36.0
	Moderate periodontitis	25	12.50
	Severe periodontitis	19	9.5
Smoking status (200)	Never	185	92.5
	Less than 1 package/day	11	5.5
	More than 1 package/day	4	2
Number of teeth (200)	20.46±5.42	3152	
Decayed teeth	1.14±1.91	176	5.58
Restored teeth	1.56±2.13	241	7.65
Root canal therapy	0.89±1.43	138	4.38
Prosthetic rehabilitation (200)	None	26	13
	Removable prosthesis	44	22
	Fixed prosthesis	130	65

SD: standard deviation

The definitive statistics of sociodemographic, anthropometric, medical, dental and periodontal characteristics are presented in Tables 1–3. The categories were evaluated regarding the differences between the groups. These results of the comparisons are presented with their mean ranks and p values as follows.

The lower education level (illiterate, elementary and secondary) has resulted in a lower number of teeth (NT, mean rank: 79.38) than the more highly educated group (more than eight years, mean rank: 118.38, p<0.05). The NT was similar among the groups educated for less than eight years (mean rank: 99.32 and 95.41, p>0.05). The PI values were found to be similar in less educated/illiterate patients (p>0.05); higher educated patients have significantly lower PI values than the other less educated/illiterate patients (mean ranks; illiterate: 96.43, elementary: 70.94, secondary: 42.66, higher: 96.44, p<0.05).

The increased frequency of tooth brushing provided an increased NT from rarely to every day (mean ranks; daily: 82.93, two to three times a week: 89.87, every day: 113.40, p<0.003); elderly people who rarely brushed or brushed two

to three times a week had a similar NT (p>0.05), while people who brushed daily had more teeth than the other groups (p<0.05). The frequency of tooth brushing significantly decreased the PI and BOP in the older adults who brushed their teeth more regularly than the other two groups (PI mean ranks; rarely: 100.12, two to three times a week: 90.87, every day: 58.19, p<0.001 and BOP mean ranks; rarely: 117.94, two to three times a week: 112.45, every day: 87.16, p=0.01, respectively).

Cognitive status is presented in Table 2. The cognitive status measured by the Schulman clock-drawing test has shown that the elderly patients who rarely brushed their teeth had higher Schulman scores than the elderly patients who brushed their teeth daily (mean ranks; rarely: 105.25, every day: 82.89, p<0.014). The elderly patients with non-regular brushing presented with similar Schulman scores to the elderly patients who brushed their teeth two to three times a week (mean rank two to three times a week: 105.62, p>0.05).

Education level affected the Schulman scores conversely. The illiterate and elementary educated groups had significantly higher scores than the secondary and higher educated patients (mean ranks; secondary: 45.29, higher: 55.51, p<0.001). However, the illiterate and elementary educated elderly patients had similar scores (mean ranks; 166.58 and 109.88, respectively, p>0.05).

A higher monthly income resulted in a lower Schulman score (mean ranks; 0–1500 TL: 120.27, 1500–3000 TL: 73.17, 3000 TL<: 58.15, p<0.001).

Significant correlations between the parameters found are as follows: the Schulman score has presented a significant positive correlation with PI (rho=0.076, p=0.04), significant negative correlation with NT (rho=-0.514, p=0.036). PI values have positive significant correlations with PISA (rho=0.057, p<0.0001), and with PESA (rho=0.183, p=0.025). The periodontal status (gingivitis/periodontitis, gingivitis and mild/moderate/severe periodontitis) did not present significant

Table 5. Odds ratios (OR) of multivariate logistic regression model (variables associated with having periodontitis or not)

		B	S.E.	Wald	df	Sig.	Exp (B)
Step 1ᵃ	Age	-0.098	0.071	1.902	1	0.168	0.906
	Gender	-0.039	0.842	0.002	1	0.963	0.962
	Education level (Higher)			3.271	3	0.352	
	İlliterate	1.767	1.803	0.960	1	0.327	5.850
	Elementary	2.510	1.629	2.374	1	0.123	12.300
	Secondary	0.948	1.269	0.557	1	0.455	2.579
	Monthly income			1.763	2	0.414	
	≤1500 TL	-1.508	1.390	1.177	1	0.278	0.221
	1500 TL≤	-0.598	1.414	0.179	1	0.672	0.550
	Smoking (more than 1 pack/day)			0.376	2	0.829	
	Never	-18.991	40193.085	0.000	1	1.000	0.000
	Current smoker	-18.108	40193.085	0.000	1	1.000	0.000
	Property	-0.545	1.268	0.185	1	0.667	0.580
	Marital status	-0.756	1.124	0.452	1	0.502	0.470
	Cognitive status	-0.175	0.217	0.652	1	0.419	0.839
	Systemic health status	-0.352	0.725	0.235	1	0.628	0.703
	BMI	-0.002	0.081	0.001	1	0.978	0.998
	NT	0.169	0.116	2.101	1	0.147	1.184
	Toothbrushing frequency (every day)			1.575	2	0.455	
	Rarely	0.727	0.753	0.933	1	0.334	2.069
	2-3 times a week	1.196	1.054	1.289	1	0.256	3.308
	Salivary flow rate (ml/min)	1.372	1.662	0.682	1	0.409	3.944
	PD	2.656	1.073	6.132	1	0.013	14.244
	AL	-0.798	0.427	3.487	1	0.062	0.450
	BOP	0.009	0.016	0.351	1	0.554	1.009
	PI	1.892	0.646	8.581	1	0.003	6.636
	PESA	0.001	0.001	0.155	1	0.694	1.001
	PISA	-0.003	0.002	3.747	1	0.053	0.997
	Constant	16.949	40193.086	0.000	1	1.000	22956020.735

AL: clinical attachment loss; BMI: body mass index; BOP: Bleeding on Probing; NT: number of teeth; PD: probing depth; PI: plaque index; PESA: periodontal epithelial surface area; PISA: periodontal inflamed surface area. Logistic regression analysis, *Significant association with the variable, p<0.05.

correlations with the sociodemographic characteristics and cognitive status (p>0.05). All of the study population had periodontal disease (gingivitis and periodontitis), most of the periodontitis patients were classified as Stage 3, Grade B periodontitis (Table 3). The study population with periodontitis had mostly mild periodontitis (36% of the whole periodontitis patients, Table 4).

Table 4. The periodontal parameters of the study population (N=200)

Parameters	Min	Max	Mean	SE	SD
AL (mm)	1.17	8.94	4.07	0.10	1.43
BOP (%)	0.04	100.00	82.50	1.94	27.48
NT	3.0	30.0	19.99	0.42	5.96
PD (mm)	1.01	5.43	2.33	0.06	0.84
PESA (mm²)	92.93	2840.80	1032.68	37.58	531.47
PI	0.16	3	1.84	0.06	0.71
PISA (mm²)	2.79	2840.80	717.03	39.56	559.48

BOP: Bleeding on Probing; AL: clinical attachment loss; NT: number of teeth; PD: probing depth; PESA: periodontal epithelial surface area; PI: plaque index; PISA: periodontal inflamed surface area; SD: standard deviation; SE: standard error.

Logistic regression analysis was performed to determine the variables whether having an effect on "having periodontitis or not" in this study population. The correct prediction percentage was found to be 76.3% in the logistic regression analysis model used, including the sociodemographic, anthropometric, medical and dental factors and cognitive status (Table 5). The logistic regression analysis has revealed odds ratios of having periodontitis regarding the education level of 5.80, 12.30 and 2.579 when compared to the highly educated group in groups with lower education level (illiterate, elementary and secondary, respectively). The patients having decreased NT have a 1.184-fold higher risk of having periodontitis (Table 5). The volunteers brushing their teeth rarely and two to three times a week have presented odds ratios of 2.069 and 3.308, more than the volunteers brushing their teeth every day (Table 5). The periodontal parameters (PD, BOP, PI, and PESA) have presented odds ratios that varied between 1.001 and 14.244 with periodontal status (Table 5). The salivary flow rate has also presented an odds ratio of 3.944 as a confounder (Table 5).

Discussion

In the present study, the oral and periodontal health/disease status of a geriatric population in Turkey was investigated, and the hypothesis that the investigated sociodemographic, anthropometric and cognitive factors have an effect on the periodontal health/disease status of this population was tested. Cognitive status has a negative correlation with oral hygiene measures. The education level, NT, and salivary flow rate were found to have an effect on having periodontitis.

Some sociodemographic and dental characteristics have shown differences when compared to other previous studies evaluating the oral health status of the geriatric population in Turkey. The percentage of illiterate patients (14%) in the present study was lower than those (57.49%) in the study of Arpak et al. (19) and also lower than those (25.7%) in the

study of Uzun and Nazlıel-Çelenligil (9) and those (23.8%) in the study of Eren et al. (10). The percentage of dentate patients was higher, as expected, than the other studies conducted in Turkey above, as we included dentate patients in our study to evaluate the above-mentioned factors regarding their effect on the periodontal health status. This is also valid for the mean NT (19.9 ± 5.96). The percentage of patients reporting daily tooth brushing was higher (53%) than the other studies (1.9%, (6); 31%, (9); and 15%, (11)).

However, the number of decayed and restored teeth was not promising, although it was lower than the other studies. The mean number of decayed teeth was 1.23 in the present study, while it was approximately 0.97 (12), 2.7 (10), and 11% of the remaining teeth (19) in the other studies. The mean number of restored teeth (1.77 (66.17%) restorative and 0.95 (3.53%) root-canal therapy) was higher than those of the older people in the study by Arpak et al. (19) (0.76%), Ünlüer et al. (8) (0.6%), and Eren et al. (10) (0.27%). This situation might be due to the study population. The studies mentioned were conducted in residential homes in Turkey, while our study was conducted in a university clinic. Thus, the mean number of decayed teeth was 1.23 (4.6%) in the present study, which was a lot lower than the other studies conducted in Turkey (9), 22% in England (20) and 45.1%, in Italy (21). However, the comments driven from this statement should be evaluated with caution as some of the data from the other countries were obtained from national surveys. Our study group has a higher percentage of conservative treatment and root canal therapy related to health insurance; the entire study group had health insurance that covered dental treatments.

Prosthetic restorations consisted of 22% removable and 65% fixed; and was found higher than those in a study conducted in an university clinic in our country (52.3 removable and 15–20% fixed, respectively, (9)). This difference might be the result of a higher NT in our study group.

Most of the sociodemographic characteristics, such as education, monthly income and health insurance were not found to be different regarding the periodontal status when the study groups were compared. Although the mentioned factors are accepted to affect the periodontal health status (22), the population in the present study did not present this kind of effect. However, among the sociodemographic parameters, education level was found to have an association with "having periodontitis or not", with varying odds ratios between 2.58 and 12.30 when the higher educated group was accepted as reference.

We have used the statement "having periodontitis or not" for the determination of confounding factors. The periodontitis patients in the present study belong to Stage 3 (90.52%) and Grade B (99.14%). The logistic regression analysis has revealed that the decreased NT results in the deterioration of periodontal status (having periodontitis) with an odds ratio 1.184; and to be illiterate or to have education ≤ eight years might have resulted in having periodontitis with the odds ratios 12.30 and 5.85. The increased NT with a greater amount of education and the cumulative effect of the increased exposure

to periodontal disease might result in more retained healthy teeth, but also with a higher periodontal treatment need (7). Arpak et al. (7) have evaluated the Community Periodontal Index of Treatment Needs (CPITN) in an institutionalized geriatric patient group. They found that there were few healthy periodontal quadrants. This statement was supported by Tezel et al. (11) after seven years, and Gökalp et al. (12) reported similar results regarding the lower oral hygiene and periodontal health of the older adults in Turkey. Although the periodontal treatment needs were not evaluated in the present study, the percentage of periodontal disease showed that the periodontal treatment need is non-negligible in the present study population, and most probably in the geriatric population in our country – although the percentage of severe periodontitis in our study population was lower (9.5%) than the global prevalence (10.5–12%, (23)), than in the USA (11%, (24)), and than in Poland (98%, (25)).

The salivary flow rate has also affected the periodontal status in the present study (odds ratio 3.944). Xerostomia is the most common intraoral change in old age and this is observed in approximately 30% of older individuals (26). The most important cause of dry mouth observed in elderly individuals was determined as medication (26). Although 68.5% of the participants of the present study have a systemic disease, and use medication for diagnosed diseases, the logistic regression analysis has not revealed that the presence of a systemic disease has an effect on periodontal disease deterioration.

The cognitive status of the study population was also investigated with the accepted prediction that the cognitive function is related to daily activities such as oral hygiene, which explains the cross-sectional associations (27). The Schulman clock-drawing test was used to evaluate the cognitive status (18). Steinmassl et al. (18) have suggested that the Shulman clock-drawing test score might also reflect the patient's oral hygiene ability, besides to reflect the patients' cognitive status. In the present study, higher Schulman scores were correlated positively with PI scores and negatively with NT in the present study, as supported by the study by Kaye et al. (27). Similar to our results, mild cognitive impairment was reported to have an association with periodontitis and tooth loss in various studies (28-30). The association between the cognitive abilities and periodontitis was suggested to be related to systemic inflammation and cytokines (31). The periodontal inflammation status was determined with PISA and PESA values (15). The significant correlations of the PI with PISA and PESA have revealed that poor oral hygiene is related to an increased inflammatory surface area. The percentage of older participants brushing their teeth every day was 53% in the present study; the elderly participants who brushed their teeth two times every day was 54% in Denmark (32), 30% in Lithuania (33), 31% in England (34), and 85% in Japan (35). Further studies might evaluate the systemic inflammatory markers related to the association between periodontal diseases and cognitive impairment in this particular patient group.

The current study has several limitations. First of all, with the design of the present study (cross-sectional) a causal relationship could not be determined. Since the study question was about periodontal health/disease status and its determinants, dentate participants were invited to participate. Thus, the percentage of non-dentate patients and the reasons for teeth loss could not be determined clearly in this study population, although the aim of the present study was not to determine it.

Besides this, the general health status was recorded according to the self-report by the elderly patients, which was not supported by the biochemical tests and/or physician's examination at the beginning of the present study. The patients in our study reported that they had a systemic disease and the percentage of these participants who used prescribed drugs for the systemic diseases was 68.5%. Our study group demonstrated a lower percentage of cardiovascular diseases (41%) and diabetes (6.5%) than the population in the study of Uzun and Nazlıel-Celenligil (9), than those in the study of Eren et al. (10) (54% and 23%).

The sample of the present study was not representative of the geriatric population in Turkey; the study group did not include periodontal health situation, did not include patients randomly selected from different living environments, such as in their own home and in care and rehabilitation centers from all over the country, to form a database from which to draw an oral health profile and to develop an oral health strategy plan for the older adults. For this reason, the discussion of our results was performed using the studies conducted in our country rather than individual countries and global data.

Conclusion

Despite the limitations, the results of our study are even more important considering the strengths of our study. None of the studies conducted in our country before has evaluated the sociodemographic, medical characteristics and cognitive status in terms of their effects on periodontal health/disease with their correlations. This situation shows that the present study contains important evaluations and results, providing a scientific basis to develop national oral health programs (preventive and therapeutic) for the older adults in our country.

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