RESEARCH ARTICLE

Turkish Journal of Psychiatry 2023;34(4):262–271

https://doi.org/10.5080/u27364

Oral Health Status of Outpatients with Schizophrenia in Ankara, Türkiye: A Descriptive Study

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ABSTRACT

Objectives: To evaluate the oral health status and denture treatment needs of a group of outpatients with schizophrenia.

Methods: One hundred and eighty-eight patients diagnosed with schizophrenia were evaluated. Socio-demographic characteristics, eating habits, alcohol consumption, smoking status, oral hygiene attitudes, medical status, medications and the data related to dental visit were obtained via structured questionnaire of 45 questions. Medication information were confirmed from hospital records. The DMFT score (the Total of decayed, missing and filled teeth), denture status, Community Periodontal Index of Treatment (CPITN) and attachment loss were recorded in accordance with the criteria defined by the WHO.

Results: The mean DMFT score was 11.1±8.6. Total number of teeth decreased, while the number of decayed teeth and DMFT scores increased with age ($p<0.001$). There was no relationship between the anticholinergic effects of antipsychotics and the teeth count, number of decayed, filled and missing teeth, and the DMFT scores. The CPITN assessment revealed that 71.6% of the patients had healthy periodontium, 7.4% exhibited gingival bleeding upon probing, and 21% had dental calculus. Psychotropic medication and tooth brushing habits were associated with CPITN scores. Male sex was associated with higher frequency of denture need ($p<0.001$), while no association was observed with the education level and antipsychotic use ($p>0.001$).

Conclusion: Physicians and dentists have to work in coordination to maintain good oral health of patients with schizophrenia. Patients should be encouraged for regular dental check-ups and dentist should take utmost care of the oral hygiene maintenance.

Keywords: DMFT, Oral Health, Outpatient, Schizophrenia

INTRODUCTION

Since oral health has a substantial impact on overall health in the long term, maintenance of oral health becomes necessary for overall wellbeing. It is reported in 2016 by The World Dental Federation (FDI) that oral health is a fundamental component of physical and mental health (Glick et al. 2016). There is a complex relationship between mental disorders and oral diseases due to the shared social determinants and bidirectional interaction mechanisms that involve interconnected social, behavioral, psychological, and biological processes (Joury et al. 2023). Poor oral health has an effect on daily functioning and quality of life especially in patients with mental health disorders (Kuipers et al. 2021). It is known that oral health is a poor priority in evaluating psychiatric disorders, (Scrine et al. 2018) although oral health problems have been reported at significant rates in relation to the nature of the disease (Gurbuz et al. 2010, Gurbuz et al. 2011a, Gurbuz et al. 2011b, Kisely et al. 2016).

Schizophrenia is a serious mental disorder that affects a person's thinking, perception, self experience, cognition, volition, affect and behaviours (WHO 2019). Schizophrenia

Received: 11.06.2023, **Accepted:** 08.11.2023, **Available Online Date:** 13.12.2023

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has been reported to be one of the 5 major psychiatric disorders (Cross-Disorder Group of the Psychiatric Genomics Consortium 2013) and affects more than 20 million people worldwide (GBD 2017, Disease and Injury Incidence and Prevalence Collaborators 2018).

A consequential poor oral health has been reported in patients with schizophrenia (Thomas et al. 1996, Agarwal et al. 2021, Kurokawa et al. 2022). These patients have a large number of tooth decay and periodontal disease due to difficulties such as deterioration in executive functions, reluctance to dental treatment, financial difficulties resulting from loss of work, inadequate family and community support, misunderstanding in the community and the unwillingness of some dentists to treat these individuals (Matevosyan 2010). Moreover, some of these patients lack the ability or motivation to meet their oral hygiene needs. Poor oral hygiene, higher intake of carbohydrates/sweets, smoking, alcohol consumption (Kisely et al. 2015), duration of psychiatric disorder, duration of medication, and less access to dental services causes high risk for poor oral health among this population (Kisely 2016, Slack-Smith et al. 2017).

Most of the existing literature related to the oral health of patients with schizophrenia has been published in specialty journals in the field of oral health, and the majority of the studies have focused on hospitalized patients (Chu et al. 2012; Bertaud-Gounot et al. 2013, Kurokawa et al. 2022). To the best of our knowledge, only a limited number of studies that focus on the oral health status of outpatients with schizophrenia (Arnaiz et al. 2011, Lopes et al. 2021, Soares et al. 2023) have been conducted so far, therefore, the objectives of this descriptive study were to determine oral health status and denture treatment needs of outpatients with schizophrenia.

METHODS

The ethical approval for the study was obtained from the Non-Interventional Clinical Research Ethics Board of Hacettepe University (HEK 07/24). It was conducted in the Outpatient Psychiatric Clinic of the Adult Hospital of the same university in Ankara, the capital city of Türkiye.

One hundred and eighty-eight (106 male, 82 female) patients diagnosed with schizophrenia according to DSM-IV-TR criteria (American Psychiatric Association 2000) were included in the study between September 2008 and March 2009 from Psychiatric Out-Patient Clinic. Hospitalized patients, patients with aggressive behavior and lack of cooperation, and patients with mental retardation were not included in the study. Having another psychiatric disorder was not considered an exclusion criterion. All patients gave their written informed consent. The data were gathered via a structured, pre-tested questionnaire conducted face-to-face and an examination form. The questionnaire and examination form took inspiration from the survey forms used in "Turkish Oral-Health Profile 2004" study (Gökalp and Doğan 2009). The questionnaire consisted of 45 questions to determine some socio-demographic characteristics, eating habit, alcohol consumption, smoking, oral hygiene habits and characteristics related to dental visit. Neglect of tooth brushing was defined as cleansing the teeth not at all or fewer than once a day. Educational level was recorded as the completed level of education.

The DMFT score (D: decay, M: missing, F: filled, T: total, DMFT: total of decayed, missing and filled teeth), denture status, Community Periodontal Index of Treatment (CPITN) (no signs of periodontal disease (CPI0), gingival bleeding after gentle probing (CPI1), supragingival or subgingival calculus (CPI2), pathologic pockets 4–5 mm deep (CPI3) and pathologic pockets >5 mm deep (CPI4)) and attachment loss (measurement of the probing depth and the distance from the gingival margin to the cement-enamel junction) were recorded in accordance with the criteria defined by the World Health Organization (WHO) (WHO 1997). Third molars were excluded from the study and root caries were not evaluated. Dental and prosthetic needs of the patients were also recorded. All oral examinations were performed in the Outpatient Psychiatric Clinic, equipped with oral mirror and 0.5 mm ball ended CPITN probes under adequate light. In addition, the presence of halitosis and the appearance of the tongue and lips and the saliva viscosity were examined by applying the Oral Assessment Guide Psychiatric Care (OAG-PC) criteria (Sjögren and Nordström 2000).

Functional dentition has been defined as "the retention of a natural, aesthetic, functional dentition of no less than 20 teeth throughout life with no need for tooth replacement" and edentulousness is absence of any natural teeth (Chalub et al. 2016).

Data related to the medication used by patients for physical and psychiatric diseases were obtained by face-to-face interviews and confirmed from hospital records. The medications used were classified according to their anticholinergic properties as "0 (no anticholinergic potential)", "+ (low anticholinergic potential)", "++ (moderate anticholinergic potential)", and "+++ (high anticholinergic potential)"(Briet et al. 2017).

Statistical analyses were carried out using SPSS Version 15.0 (SPSS Inc., Chicago, IL, USA). Chi square test was used to analyze the differences between rates. Mann Whitney U and Kruskal Wallis tests were used to detect differences between medians. Statistical significance was established at $p<0.05$.

RESULTS

Survey Results

The study group was predominantly middle aged or older and the mean age of the participants was 37.7±11.9 ranging from as young as 15 to as old as 70 years old. The distribution of patients by gender was 56.3% for male and 46.3% for female. Almost three-fourth of the participants (73.4%, n=138) had graduated from high school or university; two-thirds (62.8%, n=118) were single; only 27.1% (n=51) was working at the time of the study.

Of the participants, 9.6% (n=18) stated that they had no tooth brush. Tooth paste was used among 64.9% (n=98) of the tooth brush owners. One-fourth of the participants stated that they were using some other products to clean their teeth and/or mouth such as dental floss 4.8% (n=9); toothpick 18.6% (n=35); mouthwash %2.1 (n=4). Nine participants (4.8%) stated that they had never visited a dentist; only four participants (2.1%) were visiting the dentist regularly; 79.4% of the ever-visitor participants (n=179) had visited the dentist within the last year.

Of the participants, 25.5% (n=48) was skipping lunch, 23.9% (n=45) breakfast; almost all of them (95.7%) ate snacks.

Forty-eight point nine percent of the participants were current smokers while 32.4% had never smoked. One hundred twenty participants (63.8%) stated that they never drink alcoholic beverages while 22.3% (n=22.3) were ex-drinkers and 13.8% (n=26) were current drinkers. Age of onset of alcohol consumption was 10-35.

DMFT Index

The mean DMFT score for the 188 patients was 11.1±8.6, there were no statistically significant differences between genders, male patients had a mean DMFT of 11.3±9.0, while females had a score of 10.8±8.2. The number of teeth decreased with the increasing age while number of missing teeth and DMFT increased (p<0.001). The number of missing

Table 1. DMFT Scores (mean±standart deviations; min-max) By Some Characteristics Of Patients With Schizophrenia

	n	Decayed	Filled	Missing	DMFT	Number of Teeth
Age(n=188)						
<25	22	1.2±1.7; 0-4	1.1±1.7; 0-7	0.6±1.1; 0-4	2.8±2.6; 0-11	29.4±1.5; 28-32
25-34	65	2.2±2.6; 0-10	1.9±2.5; 0-11	3.6±4.3; 0-16	7.6±6.0; 0-25	27.1±4.6; 12-32
35-44	49	2.1±2.9; 0-11	2.6±4.1; 0-20	7.3±5.5; 0-28	12.0±6.8; 0-28	23.6±5.7; 0-29
45-54	29	1.9±2.4; 0-10	1.3±2.5. 0-13	11.7±8.0; 1-32	15.0±7.7; 3-32	19.3±8.0; 0-29
55+	23	1.5±2.3; 0-10	1.0±1.6; 0-5	19.5±10.5; 1-32	22.0±9.8; 3-32	12.3±10.3; 0-31
p*		0.567	0.111	**<0.001**	**<0.001**	**<0.001**
Gender (n=188)						
Male	106	2.2±2.8; 0-11	1.5±2.3; 0-11	7.7±8.5; 0-32	11.3±9.0; 0-32	23.3±8.3; 0-32
Female	82	1.6±1.9; 0-10	2.1±3.5; 0-20	7.1±7.9; 0-32	10.8±8.2; 0-32	23.6±7.7; 0-32
p**		0.508	0.248	0.666	0.767	0.887
Educational level						
Middle school or less	50	2.12±2.7	1.2±2.3	9.6±9.4	12.9±9.7	21.2±9.1
High school, University or more	138	1.9±2.4	2.0±3.1	6.6±7.7	10.4±8.1	24.2±7.5
p*		0.563	0.085	**0.021**	**0.017**	**0.025**
Anticholinergic activity (n=183***)						
+	58	1.7±2.3; 0-11	1.2±1.6; 0-8	7.3±8.7; 0-32	10.2±8.8; 0-32	23.5±8.2; 0-31
++	40	2.1±2.9; 0-10	1.8±2.9; 0-13	8.1±8.8; 0-32	11.9±8.9; 0-32	23.3±8.9; 0-32
+++	85	2.1±2.4; 0-10	2.1±3.5; 0-20	7.0±7.4; 0-32	11.1±8.4; 0-32	23.6±7.3; 0-32
p*		0.524	0.740	0.666	0.497	0.938

* Kruskal Wallis Test
** Mann Whitney U Test
*** A total of 5 patients, 2 of whom did not use drugs and 3 of whom had a drug code of "0", were excluded from the analysis

teeth (p=0.005) and DMFT (p=0.019) were the highest and the number of teeth (p=0.007) was the lowest in patients with education years of five or less. There was no relation observed between anticholinergic activity of antipsychotic medication and the number of total teeth, decayed, filled, missing teeth, and DMFT (Table 1).

Of the participants, 4.8% was edentulous (n=9); 22.3% had fewer than 20 natural teeth (n=42). With the increasing age, the rate of functional dentition dramatically decreased (p<0.001). Moreover, the situation was worse for the patients whose educational level were middle school or less (p=0.006), and even though no statistically significant difference was observed, with the increasing anticholinergic effect of the antipsychotic medication, the rate of patients who do not have functional dentition also increased (Table 2).

About three-fourth of the participants (77.1%, n=145) had no denture at lower jaw, while 12.8% (n=24) had at least one bridge, 5.8% (n=10) had partial denture and 4.3% (n=8) had total denture. These figures for upper jaw were 70.7% (n=133), 16.5% (n=31), 5.9% (n=11) and 5.9% (n=11), respectively. However, denture need had showed a worse outlook; two-fifth of the participants had a denture need for at least one jaw (41.5%, n=78 for upper jaw and 39.1%, n=75 for lower jaw). With the increasing age, the denture use and need rates increased and the differences were statistically significant for both jaws (p<0.05). Among male patients,

Table 2. Percent Distribution of the Status of Functional Dentition and Edentulousness By Some Characteristics of Patients with Schizophrenia

		Functional Dentition (%)		Edentulousness (%)	
	n	**No**	**Yes**	**No**	**Yes**
Age (n=188)					
<25	22	-	100.0	100.0	-
25-34	65	9.2	90.8	100.0	-
35-44	49	16.3	83.7	98.2	2.0
45-54	29	41.4	58.6	93.1	6.9
55+	23	69.6	30.4	73.9	26.1
p		**<0.001**[a]		*	
Gender (n=188)					
Male	106	22.6	77.4	94.3	6.7
Female	82	22.0	78.0	96.3	3.7
p		0.910		0.734**	
Educational level (n=188)					
Middle school or less	18	36.6	64.0	6.0	94.0
High school, University or more	54	17.4	82.6	4.3	95.7
p		**0.007**		0.702***	
Anticholinergic activity(n=183***)					
+		19.0	81.0	94.8	5.2
++		22.5	77.5	95.0	5.0
+++		24.7	75.3	96.5	3.5
p		0.721		*	

* The number of observations was not enough to perform statistical test.
** Fisher's Exact Test
*** A total of 5 patients, 2 of whom did not use drugs and 3 of whom had a drug code of "0", were excluded from the analysis.
[a]The groups that make the difference are the 35-44 and 45-54 age groups.

Table 3. Denture Use and Need By Some Characteristics of the Patients with Schizophrenia (%)

	Maxillary Denture		Mandibulary Denture		Total	
	Use	**Need**	**Use**	**Need**	**n**	**(%*)**
Age (n=188)						
<25	-	9.1	-	9.1	22	11,7
25-34	16.9	38.5	13.9	33.8	65	34,6
35-44	30.6	55.1	22.4	51.0	49	26,1
45-54	62.1	37.9	44.8	51.7	29	15,4
55+	47.8	56.5	43.5	47.8	23	12,2
p	**<0.00[a]**	**0.003[b]**	**<0.001[c]**	**0.006[d]**		
Gender (n=188)						
Male	25.5	50.0	21.7	46.2	106	56,4
Female	34.1	30.5	24.4	31.7	82	43,6
p	0.195	**0.007**	0.663	**0.044**		
Educational level						
Middle school or less	28,0	44,0	20,0	48,0	50	26,6
High school, University or more	29,7	40,6	23,9	37,0	138	73,4
p	0,820	0,674	0,572	0.172		
Anticholinergic activity (n=183**)						
+	24.1	39.7	19.0	34.5	58	31.7
++	22.5	55.0	15.0	50.0	40	21.9
+++	35.3	37.6	28.2	40.0	85	46.4
p	0.210	0.168	0.190	0.304		

* Column percentages; others are row percentages.
**A total of 5 patients, 2 of whom did not use drugs and 3 of whom had a drug code of "0", were excluded from the analysis.
[a]The groups that make the difference are the 25-34 and 35-44 age groups.
[b]The groups that make the difference are the 25-34 and 45-54 age groups.
[c]The group that make the difference is the 35-44 age group.
[d]The group that make the difference is the 25-34 age groups.

the percentages of mandibular and maxillary denture need were significantly higher (p<0.001). There was no significant difference by the education level and the type of antipsychotic medication (p>0.001) (Table 3).

CPITN Index

Eleven patients could not be evaluated because they did not meet the CPITN evaluation criteria, and one patient was excluded because she only had the CPI 3 score. Of the 176 patients eligible for CPITN evaluation, 71.6% had a healthy periodontium (CPI 0), 7.4% had gingival bleeding after probing (CPI 1), and 21% had dental calculus (CPI 2). The most related characteristics with CPITN were found as anticholinergic activity of antipsychotic medication used and tooth brushing habit (Table 4). Of the patients whose CPITN could not be evaluated, 36.4% had visited a dentist within the last year, 63.6% had visited more than one year ago.

Halitosis was the most observed (70.2%, n=132) finding of the mouth inspection, this was followed by viscous saliva (2.1%, n=4), hyperemic mucous membranes (2.1%, n=4), dry and cracked lips (1.6%, n=3), papilla loss (1.1%, n=2) and cracked tongue (0.5%, n=1). Patients who did not brush their teeth and current smokers had the highest rate of halitosis (Table 5).

Table 4. CPITN Distribution By Some Characteristics of Patients with Schizophrenia

	n	CPITN* (n=176)		
		Healthy (%)	Bleeding (%)	Tartar (%)
Age**				
<25	22	81.8	9.1	9.1
25-34	65	72.3	10.8	16.9
35-44	48	58.3	4.2	37.5
45-54	24	83.3	-	16.7
55+	17	76.5	11.8	11.8
p		0.174**		
Gender				
Male	98	66.3	5.1	28.6
Female	78	78.2	10.3	11.5
p			0.059**	
Anticholinergic activity (n=172)				
+	123	89.1	1.8	9.1
++	13	80.6	2.8	16.7
+++	36	55.6	13.6	30.9
p		**<0.001**[**a]		
Regular eating				
Yes	102	70.6	3.9	25.5
No	74	73.6	12.2	14.9
p			0.729**	
Eating sweet snacks				
Yes	125	68.8	7.2	24.0
No	51	78.4	7.8	13.7
p		0.315**		
Last dental visit				
≤ 1 year ago	75	76.0	8.0	16.0
> 1 year ago	101	68.3	6.9	24.8
p			0.544**	
Frequency of tooth brushing				
No brushing	106	62.3	9.4	28.3
1 time	33	81.8	-	18.2
2 times	25	88.0	12.0	-
3 times	12	91.7	-	8.3
p		**0.002**[**b]		
Smoking				
Never	60	80.0	11.7	8.3
Ex-smoker	31	64.5	12.9	22.6
Current smoker	85	68.2	2.4	29.4
p		0.051**		
Total	176	71.6	7.4	21.0

* 11 patients could not be evaluated because they did not meet the CPITN evaluation criteria, and 1 patient was excluded because she had the only CPI 3 score.
** Chi square test was performed after CPITN was divided into two subgroups as "healthy (CPI 0)" and "unhealthy (CPI 1 and CPI 2)".
[a]The group that makes the difference is the drug group with the highest anticholinergic effect (+++ group).
[b]The group that makes the difference is the group that "doesn't brush their teeth".

Table 5. Halitosis Distribution By Some Characteristics of Patients with Schizophrenia

	Halitosis (%)		
	No	**Yes**	**n**
Age(n=188)			
<25	36.4	63.6	
25-34	29.2	70.8	
35-44	22.4	77.6	
45-54	37.9	62.1	
55+	30.4	69.6	
p	0.618		
Gender (n=188)			
Male	28.3	71.7	
Female	31.7	68.3	
p	0.613		
Anticholinergic activity (n=183*)			
+	25.9	74.1	
+	30.0	70.0	
+++	31.8	68.2	
p	0.747		
Frequency of tooth brushing			
No brushing	18.1	81.9	116
1 time	48.6	51.4	35
2 times	48.0	52.0	25
3 times	50.0	50.0	12
p	**< 0.001**		
Smoking			
Never	41.0	59.0	61
Ex-smoker	48.6	51.4	35
Current smoker	15.2	84.8	92
p	**<0.001**		
Total	29.8	70.2	188

* 2 patients who did not use medication and 3 patients with a medication code of "0" were excluded from the analysis.

DISCUSSION

This is the first study that assesses the oral health status and treatment needs of outpatients with schizophrenia in Türkiye, therefore, the results were compared with studies which evaluated the hospitalized patients with chronic schizophrenia and the recent national survey of oral health status in Türkiye (avarage population). In view of this, it seems likely that the findings provide the baseline data in this field.

In this study, the mean DT, FT, MT and DMFT values of outpatients with schizophrenia were 1.9±2.5, 1.8±2.9, 7.4±8.3 and 11.1±8.6, respectively. Kurokawa et al. (2022) reported higher DT (3.0 ± 4.1), MT (14.2 ± 10.4), FT (4.5 ± 4.9) and DMFT (21.7 ± 7.3) among 280 hospitalized patients with schizophrenia. Gurbuz et al. (2011) also reported higher DT, MT and DMFT, and lower FT values compared to our values for all similar age groups evaluated for institutionalized chronic psychiatric patients in Istanbul,

Türkiye. Although 69% of their study population was patients with schizophrenia, the main reason behind different results obtained may be attributed to inpatient or outpatient status. It was thought that the fact that the negative symptoms of outpatients were probably milder than those of patients who remained permanently in the hospital was effective in these results. Outpatients are expected to have better personal care and personal hygiene. Similarly, Arnaiz et al. (2011) reported lower DMFT scores in their study evaluating the oral health of outpatient schizophrenia patients compared to studies evaluating hospitalized patients.

Gökalp et al. (2010) evaluated individuals aged 5, 12, 15, 35-44 and 65-74 in their national research on the oral health status of children and adults in Türkiye. In the comparable age group of 35-44 years, they reported a lower mean DMFT value (10.8) than the mean DMFT value obtained in our study (12.0±6.8). Among the elderly (65-74 years old), missing teeth account for almost the entire DMFT index.

In the curent study, a steady age related increase in DMFT with a corresponding increase in the missing component has been shown. Age has been consistently reported to be an important determinant of poor oral health and oral hygiene by previous studies (Kilbourne et al. 2007, Torres et al. 2015, Wey et al. 2015, Kurokawa et al. 2022). For older people, decrease in self-cleaning due to decreased salivary secretion related to their basal diseases, poor cleaning, and a decrease in daily activities cause the deterioration of oral hygiene (Tani et al. 2012, Ngo et al. 2018). Generally, older people with worsening conditions are more likely to have worse oral function (Torres et al. 2015) due to decrease in masticatory abilities and occlusal forces as a result of teeth loss (Gerritsen et al. 2010). Moreover, the impact of antipsychotic drugs on saliva secretion has been well documented, and dry mouth has been reported as a side effect of antipsychotic drugs. (Tani et al.2012, Ngo et al.2018). Therefore, older psychiatric patients obtaining increased DMFT was not a suprising result since not only increased age but also antipsychotics use cause a higher oral health risk compared to younger and/or mentally healthy people.

Similar to our results, Kurokawa et al. (2022) reported a positive correlation between age and mean DMFT. Bertaud-Gounot et al. (2013) also showed that age and degree of disability were significant contributors to higher DMFT of older psychiatric inpatients.

This study revealed that patients with education level of middle school or less have higher number of missing teeth (M) and DMFT, and lower number of teeth compared to patients with higher education levels. Previous studies have hypothesized that the level of education was a significant factor for oral health status (Fahim et al. 2022, Silva and Oliveira 2018). Education enhances oral health awareness and the sense of caution of individuals, thus encouraging them to maintain oral health (Levine and Stillman-Lowe 2019).

There was no relation observed between the anticholinergic activity of antipsychotic medication and the number of total teeth, decayed, filled, missing teeth, and DMFT. Similarly, smoking was not associated with DMFT. Jiang et al. (2019) reported in their systematic review and meta-analysis studies that although there are studies showing the existence of a relationship between smoking and dental caries, there is not enough evidence to confirm the assumption that smoking as a risk factor is involved in the dental caries process. Gender also was not a statistically significant explanatory factor for DMFT. Males exhibited a higher number of decayed and missing teeth than females, while females have more filled teeth than males, although the difference was not statistically significant.

The percentages of mandibular and maxillary denture need were also higher among male patients than females, and the difference was statistically significant. This result could be explained by men's negative attitudes and unwillingness about dental visits, and as a result, men visit dentists for emergency dental treatment, but not for restorative treatments. In support of this idea, Furuta et al. (2011) reported that men visit dentists less frequently compared to women and when they do, the reason is often because of an acute problem and not for disease prevention. In addition, women are more likely to adhere to recommended treatment following a dental check-up. In a recently published review (Lipsky et al. 2021), it has been identified that men are more likely to ignore their oral health, have poorer oral hygiene habits, and experience higher rates of periodontal disease due to a combination of biological and gender related reasons (immune system factors, hormone differences, poorer oral hygiene behaviors, and greater tobacco use), while women demonstrate better oral health behaviors than men and exhibit more positive attitudes about dental visits.

Gökalp et al. (2010) reported healthy periodontal tissue (CPI0) in more than 50% of 15 year-olds; while this trend gradually declined in 35–44- and 65–74-year-olds in Turkish population. The prevalence of healthy periodontal tissue in our study group was 76.5%, which was much higher than both the avarage population (Gökalp et al. 2010) and the hospitalized psychiatric patients in Türkiye (8.8%) (Gurbuz et al. 2011b).

In a study comparing outpatient psychiatric patients with the general population in Australia, 41% of psychiatric patients had healthy periodontal tissue (CPI 0), 14% had bleeding after probing (CPI 1), and 35% had dental calculus (CPI 2). It has been reported that oral health in this subgroup is significantly worse than it is in the general population (Lalloo et al. 2013). In our study, finding the anticholinergic effect

of antipsychotics and tooth brushing habit as the factors most associated with CPITN is an expected result and is also compatible with the results of previous studies. However, it was thought that the prevalence of periodontal diseases in this patient population was lower than the prevalence in the general population and could be explained by the sample characteristics. The average age of the patients evaluated in the study (37.7±11.9) was relatively young compared to the patient groups of the compared studies (Gurbuz et al. 2011b: 49.2±11.7 and Lalloo et al. 2013: 41) and relatively educated schizophrenia patients. The fact that the number of decay and missing teeth is above the population average excludes the possibility of early detection of dental problems of patients who come for regular check-ups at the university clinic and sending the patients to the dental clinic.

In the current study, halitosis was the most observed finding of the mouth inspection. Halitosis is a characteristic finding in poor oral health and mostly due to putrefying bacteria living on the dorsum of the tongue and the volatile sulphur compounds produced from food remnants (Setia et al. 2014). Smoking has been reported to cause halitosis by altering the microbial balance of subgingival plaque and causing an increase in the absolute numbers of volatile sulphur compounds producing bacteria (Hughes and McNab 2008). Consistent with these findings, participants in our study who never brush their teeth, and current smokers reported halitosis in higher rates. Some medications which reduce salivary flow such as antidepressants, antipsychotics and narcotics also have been reported to contribute halitosis (Messadi 1997), although there was no relation observed between anticholinergic effect of antipsychotics treatment and halitosis in the current study.

Patients with schizophrenia have a higher risk of medical illness than the general population, and poor oral hygiene not only causes social problems in these patients but also predisposes them to various other systemic health problems such as diabetes, and respiratory and cardiovascular diseases (Filik et al. 2006, Cabanillas-Balsera et al. 2019, Correll et al. 2022). Therefore, oral health becomes even more important in this patient group. This study suggests that outpatients with chronic schizophrenia tend to have better dental and periodontal health status than inpatients, although the mean DMFT index was 11.1 in all the participants, which is unfavorable according to WHO (WHO 2013) (<5.0: very low, 5.0-8.9: low, 9.0-13.9: medium, >13.9: high).

One limitation of the study was that use of other drugs that may affect the oral health of schizophrenia patients, drug doses, and psychopathology and disease severity that may affect patients' attitudes towards self-care were not evaluated. Another limitation of the study is that the age factor related to the differences between genders was not controlled.

Our study is the first one evaluating the oral health status and treatment needs of outpatients with schizophrenia in Türkiye, and our findings are likely to provide basic data in this field, but this deficiency in the literature has caused limited resources to be used in the discussion.

To conclude, physicians and dentists have to work in coordination to maintain good oral health of patients with schizophrenia. Patients should be encouraged for regular dental check-ups and dentists should take utmost care of the oral hygiene maintenance. Nevertheless, further studies with larger populations are needed in the future to increase the knowledge and awareness of dentists and psychiatrists about the different aspects of this disease and to adjust available resources to best meet the diagnostic and treatment needs of these patients.

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Acknowledgement: *This study was supported by Hacettepe University Scientific Research Unit (Project no: 07D0620102).*