Research

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The DMFT Index and Its Association with Psychiatric Symptom Severity among Inpatients with Psychotic Disorders

Psikotik Bozukluğu Olan Yatan Hastalarda DMFT İndeksi ve Psikiyatrik Semptom Şiddeti İlişkisi

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ABSTRACT

Objective: This study aimed to compare oral health status, including the Decayed, Missing, and Filled Teeth (DMFT) index and its components, between hospitalized patients with psychotic disorders and healthy controls and to examine associations between DMFT and psychiatric symptom severity assessed using the Positive and Negative Syndrome Scale (PANSS), Hamilton Depression Rating Scale (HAMD), and Young Mania Rating Scale (YMRS).

Method: This study included 50 inpatients with schizophrenia (n = 18), bipolar disorder (n = 18), or schizoaffective disorder (n = 14) and 50 age- and sex-matched healthy controls. Electronic records and panoramic radiographs obtained between 2020 and 2025 were reviewed. DMFT scores were determined according to World Health Organization (WHO) criteria, excluding third molars.

Results: Patients with psychotic disorders had higher numbers of decayed teeth and missing teeth, as well as higher DMFT scores, than healthy controls. Unadjusted filled-teeth counts were similar between groups but were higher in the psychiatric group after age adjustment (incidence rate ratio [IRR] = 1.867, 95% confidence interval [CI]: 1.266–2.752). DMFT was positively correlated with PANSS, HAMD, and YMRS. After age adjustment, DMFT counts were approximately threefold higher in the psychiatric group (IRR = 3.011, 95% CI: 2.439–3.719).

Conclusion: Inpatients with psychotic disorders had a substantially greater oral disease burden than healthy controls. Findings support integrating preventive oral healthcare into the multidisciplinary management of patients with psychotic disorders.

Keywords: Psychotic disorders, oral health, DMFT index, dental caries, schizophrenia

ÖZ

Amaç: Bu çalışmanın amacı, psikotik bozukluğu olan yatan hastalar ile sağlıklı kontrollerin Çürük, Eksik ve Dolgulu Dişler (DMFT) indeksi ve bileşenlerini içeren ağız sağlığı durumlarını karşılaştırmak ve DMFT ile Pozitif ve Negatif Sendrom Ölçeği (PANSS), Hamilton Depresyon Derecelendirme Ölçeği (HAMD) ve Young Mani Derecelendirme Ölçeği (YMRS) ile değerlendirilen psikiyatrik belirti şiddeti arasındaki ilişkileri incelemektir.

Yöntem: Bu retrospektif karşılaştırmalı çalışmaya şizofreni (n = 18), bipolar bozukluk (n = 18) veya şizoaffektif bozukluk (n = 14) tanısı bulunan, psikiyatri kliniğinde yatarak tedavi gören 50 hasta ile yaş ve cinsiyet açısından eşleştirilmiş 50 sağlıklı kontrol dahil edilmiştir. 2020–2025 yılları arasında elde edilen elektronik kayıtlar ve panoramik radyografiler incelenmiştir. DMFT skorları, üçüncü molar dişler hariç tutularak Dünya Sağlık Örgütü (DSÖ) kriterlerine göre belirlenmiştir.

Bulgular: Psikotik bozukluğu olan hastalarda sağlıklı kontrollere kıyasla çürük diş sayısı, eksik diş sayısı ve DMFT skoru daha yüksekti. Düzeltilmemiş dolgulu diş sayıları gruplar arasında benzerken, yaşa göre düzeltme sonrasında psikiyatrik grupta daha yüksekti (insidans hız oranı [IRR] = 1,867; %95 güven aralığı [GA]: 1,266–2,752). DMFT; PANSS, HAMD ve YMRSile pozitif korelasyon gösterdi. Yaşa göre düzeltme sonrasında psikiyatrik gruptaki DMFT sayısı yaklaşık üç kat daha yüksekti (IRR = 3,011; %95 GA: 2,439–3,719).

Sonuç: Psikotik bozukluğu olan yatan hastalarda oral hastalık yükü sağlıklı kontrollere göre belirgin olarak daha yüksekti. Bu bulgular, koruyucu ağız sağlığı hizmetlerinin psikotik bozukluğu olan hastaların multidisipliner yönetimine entegre edilmesini desteklemektedir.

Anahtar sözcükler: Psikotik bozukluklar, ağız sağlığı, DMFT indeksi, diş çürükleri, şizofreni

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Introduction

Oral health is widely recognized as an integral component of general health and overall quality of life. The World Dental Federation (FDI) defines oral health as a multidimensional concept that extends beyond the health of the oral tissues to encompass physical, mental, and social well-being (Glick et al. 2016). In this context, increasing attention has been directed toward the complex and bidirectional relationship between mental disorders and oral diseases (Joury et al. 2023). Cognitive, emotional, and behavioral impairments associated with psychiatric disorders may adversely affect the maintenance of oral hygiene and limit access to dental care services.

Numerous studies have demonstrated that individuals with psychiatric disorders exhibit poorer oral health outcomes than the general population. In particular, severe mental illnesses have consistently been associated with a higher prevalence of dental caries, increased tooth loss, and a greater burden of untreated dental disease (Kisely et al. 2011, Kisely et al. 2015). This unfavorable oral health profile is attributable not only to inadequate oral hygiene practices but also to the chronic nature of psychiatric disorders, impaired social functioning, limited access to healthcare services, and the oral adverse effects of psychotropic medications (Friedlander and Marder 2002, Gürbüz et al. 2011).

Psychotic disorders, including schizophrenia, bipolar disorder with psychotic features, and schizoaffective disorder, are among the most severe psychiatric conditions characterized by impaired reality testing and are considered high-risk conditions for poor oral health (McCreadie et al. 2004, Gurbuz et al. 2010, Bertaud-Gounot et al. 2013, Velasco-Ortega et al. 2017). One of the most widely used epidemiological measures for assessing oral health is the Decayed, Missing, and Filled Teeth (DMFT) index. The DMFT index is a reliable measure of lifetime dental caries experience and enables comparisons of oral health status across different populations and patient groups (WHO 2013). Previous studies evaluating the DMFT index in patients with schizophrenia have consistently reported significantly higher DMFT scores than those observed in the general population, with this increase being primarily attributable to the decayed (D) and missing (M) components of the index (McCreadie et al. 2004, Gurbuz et al. 2010, Bertaud-Gounot et al. 2013, Velasco-Ortega et al. 2017). In a case-control study conducted in Spain, Velasco-Ortega et al. (2017) demonstrated that patients with schizophrenia had significantly more decayed and missing teeth, but fewer filled teeth, than healthy controls, reflecting a substantial unmet need for restorative dental treatment.

The deterioration of oral health in patients with psychotic disorders is multifactorial. Negative symptoms and reduced motivation may compromise the maintenance of adequate oral hygiene practices (Thomas et al. 1996). In addition, xerostomia (hyposalivation) associated with antipsychotic and other psychotropic medications increases the risk of dental caries by promoting the proliferation of cariogenic microorganisms (Fratto and Manzon 2014, Hu et al. 2016). Smoking, unhealthy dietary habits, and increased consumption of carbohydrate-rich foods have also been identified as additional factors contributing to poor oral health in individuals with psychotic disorders (Kisely 2016, Jiang et al. 2019).

Although the pharmacological management of psychotic disorders varies according to the clinical presentation, antipsychotic medications constitute the cornerstone of treatment. Second-generation antipsychotics are widely prescribed for schizophrenia and schizoaffective disorder, whereas mood stabilizers are frequently used in combination with antipsychotics in patients with bipolar disorder. Antidepressants may be prescribed for patients presenting with concomitant depressive symptoms, while benzodiazepines are commonly used as adjunctive therapy for the management of anxiety and agitation (Afroz et al. 2025, Sharma et al. 2025, Urien et al. 2025).

Long-term use of psychotropic medications may adversely affect oral health through both direct and indirect mechanisms. Oral adverse effects associated with antipsychotic medications include salivary flow disturbances, xerostomia, hypersalivation, dental caries, periodontal disease, and tooth loss (Sharma et al. 2025, Urien et al. 2025). Reduced salivary flow impairs the natural cleansing of the oral cavity, decreases buffering capacity, and compromises remineralization, thereby facilitating plaque accumulation and the proliferation of cariogenic microorganisms. Consequently, these changes may contribute to increased

DMFT scores, particularly through higher numbers of decayed and missing teeth, in individuals with psychotic disorders (Afroz et al. 2025, Sharma et al. 2025, Urien et al. 2025).

The adverse effects of psychotropic medications on oral health are not limited to alterations in salivary function. Second-generation antipsychotics have also been associated with an increased risk of metabolic syndrome, weight gain, insulin resistance, and impaired glucose metabolism (Mortimer et al. 2023). These metabolic disturbances, together with changes in dietary habits and an increased preference for carbohydrate-rich foods, may further increase susceptibility to dental caries. Moreover, sedation, reduced motivation, and impaired self-care may hinder the maintenance of adequate oral hygiene, thereby exacerbating oral health deterioration in patients with psychotic disorders (Mortimer et al. 2023, Afroz et al. 2025, Sharma et al. 2025, Urien et al. 2025).

Individuals with psychotic disorders have also been reported to underutilize dental care services compared with the general population. Previous studies have shown that these patients typically seek dental treatment only after the onset of pain, infection, or other acute dental conditions, whereas preventive and restorative dental care is frequently neglected (Kilbourne et al. 2007, Teng et al. 2016, Karaman et al. 2023). Consequently, untreated dental diseases often progress to tooth extraction, resulting in the loss of functional dentition and a predominance of the missing teeth component of the DMFT index (Gurbuz et al. 2010, Chu et al. 2012).

Oral health problems have been reported to be more pronounced among hospitalized patients with psychotic disorders than among those receiving outpatient care. Prolonged hospitalization has been associated with diminished self-care abilities, inadequate oral hygiene practices, and the lack of routine integration of dental care into psychiatric treatment, all of which may contribute to higher DMFT scores (Bertaud-Gounot et al. 2013, Kurokawa et al. 2022). In contrast, patients receiving outpatient care generally exhibit lower DMFT scores, although these values remain higher than those observed in the general population (Arnaiz et al. 2011). Collectively, these findings suggest that oral health in individuals with psychotic disorders is closely associated with both disease severity and the model of psychiatric care.

Although several studies have evaluated the DMFT index in patients with schizophrenia, bipolar disorder, and schizoaffective disorder, relatively few have simultaneously investigated oral health status, psychiatric symptom severity—as assessed using the Positive and Negative Syndrome Scale (PANSS), the Hamilton Depression Rating Scale (HAMD), and the Young Mania Rating Scale (YMRS)—and comparisons with a healthy control group. Therefore, a comprehensive assessment of oral health and its relationship with psychiatric symptom severity in individuals with psychotic disorders remains warranted.

Several clinical rating scales have been developed to objectively assess disease severity in psychotic disorders. In the present study, psychiatric symptom severity was evaluated using the Positive and Negative Syndrome Scale (PANSS) for psychotic symptoms, the Hamilton Depression Rating Scale (HAMD) for depressive symptoms, and the Young Mania Rating Scale (YMRS) for manic symptoms. The PANSS is a well-established and validated instrument that provides a multidimensional assessment of positive and negative symptoms in individuals with psychotic disorders (Kay et al. 1987). Likewise, the HAMD and YMRS are widely accepted standardized clinical scales for assessing the severity of depressive and manic symptoms, respectively (Hamilton 1960, Young et al. 1978). The combined use of these assessment tools enables a comprehensive evaluation of the associations between different psychopathological dimensions and oral health in patients with psychotic disorders.

The present study aimed to evaluate oral health status in hospitalized patients diagnosed with schizophrenia, bipolar disorder, or schizoaffective disorder using the Decayed, Missing, and Filled Teeth (DMFT) index and to investigate the associations between DMFT and its components and psychiatric symptom severity as assessed by the PANSS, HAMD, and YMRS. By comparing patients with psychotic disorders with an age- and sex-matched healthy control group and concurrently evaluating psychotic, depressive, and manic symptom dimensions, the present study seeks to address the limited evidence integrating these aspects within a single hospitalized cohort and to contribute to a more comprehensive understanding of the relationship between psychotic disorders and oral disease burden. We hypothesized that hospitalized patients with psychotic disorders would have a higher oral disease burden, reflected by

higher DMFT scores, than healthy controls and that greater psychiatric symptom severity would be associated with higher DMFT scores.

Method

Sample

A total of 100 individuals were included in this retrospective, comparative study. The study group consisted of 50 hospitalized patients diagnosed with schizophrenia (n = 18), bipolar disorder (n = 18), or schizoaffective disorder (n = 14) at the Department of Psychiatry, Hatay Mustafa Kemal University Faculty of Medicine. Psychiatric diagnoses were established by board-certified psychiatrists according to routine clinical diagnostic criteria.

The control group consisted of 50 individuals who had attended the Department of Oral and Maxillofacial Surgery during the same study period and had complete electronic dental records and panoramic radiographs of adequate diagnostic quality for evaluation. Controls were selected to match the psychiatric group with respect to age and sex, and each group included 25 female and 25 male participants. Absence of a psychiatric disorder in the control group was confirmed through review of institutional medical records, verifying the lack of any documented psychiatric diagnosis or history of psychiatric treatment. Because of the retrospective design of the study, no additional structured psychiatric interview or rating scale was administered specifically to confirm the psychiatric status of the control group.

To minimize the influence of potential confounding factors on oral health outcomes, all participants were non-smokers and had no systemic diseases, including diabetes mellitus, or any other medical conditions known to affect oral health. Demographic characteristics, psychiatric diagnoses, and clinical data of the patients were retrospectively retrieved from the electronic medical record system. Psychiatric diagnoses were based on the clinical evaluations documented by psychiatrists in the Department of Psychiatry.

As this was a retrospective study, the sample size was determined by the number of eligible patients with complete clinical and radiographic records available during the predefined study period who met the inclusion and exclusion criteria. An equal number of age- and sex-matched healthy controls was included, resulting in a total sample of 100 participants (50 patients and 50 controls). A post hoc power analysis was performed using G*Power software (version 3.1.9.7; Heinrich Heine University, Düsseldorf, Germany), with the DMFT index defined as the primary outcome. Based on the observed mean DMFT scores of 14.86 ± 7.92 in the psychiatric group and 4.78 ± 1.98 in the control group, the standardized effect size was approximately Cohen's d = 1.75. With 50 participants per group and a two-sided α level of 0.05, the achieved statistical power exceeded 99.9%.

Patients were eligible for inclusion if they had a diagnosis of schizophrenia, bipolar disorder, or schizoaffective disorder; had been hospitalized and followed in the Department of Psychiatry between 2020 and 2025; had attended the Department of Oral and Maxillofacial Surgery during the same period; and had complete electronic medical records and panoramic radiographs available for evaluation. In addition, only non-smokers without systemic diseases that could potentially affect oral health, including diabetes mellitus, were included.

Patients were excluded if panoramic radiographs were unavailable or of inadequate diagnostic quality, if dental examination records were incomplete, or if they had a primary psychiatric diagnosis other than schizophrenia, bipolar disorder, or schizoaffective disorder. Following application of these eligibility criteria, 50 patients with psychotic disorders were included in the final analysis.

Procedure

This study was approved by the Non-Interventional Clinical Research Ethics Committee of Hatay Mustafa Kemal University (Approval No. 26, dated July 30, 2025) and was conducted in accordance with the principles of the Declaration of Helsinki. As this was a retrospective study based on existing medical and

dental records, obtaining additional informed consent from the participants was not required as part of the ethics approval process.

The study was conducted at Hatay Mustafa Kemal University using electronic medical records from the Department of Psychiatry and archived panoramic radiographs and dental records from the Department of Oral and Maxillofacial Surgery. Records of patients who were hospitalized in the Department of Psychiatry and had also attended the Department of Oral and Maxillofacial Surgery between 2020 and 2025 were retrospectively reviewed. Psychiatric diagnoses and symptom severity assessments were obtained from the institutional medical records. As part of routine inpatient psychiatric care, clinical examinations and psychiatric rating scale assessments were performed by specialist physicians working in the Department of Psychiatry and documented in the patients' medical records.

Electronic records were screened according to predefined eligibility criteria. Demographic characteristics, psychiatric diagnoses, psychiatric rating scale scores, and oral health data were extracted from the institutional records using a standardized data extraction procedure. Only records containing the required clinical information and diagnostic-quality panoramic radiographs were included in the analysis.

All panoramic radiographs were evaluated by the same experienced investigator according to World Health Organization (WHO) criteria, and DMFT scores were calculated with third molars excluded. To assess the reliability of the radiographic evaluations, 20 randomly selected panoramic radiographs, representing 20% of the study sample, were re-evaluated by the same investigator. Intra-observer agreement was excellent (Cohen's $\kappa = 0.86$). After completion of data extraction and verification, the dataset was prepared for statistical analysis.

The findings obtained from the psychotic disorder group were compared with those of an age- and sex-matched healthy control group. Data were retrospectively collected from electronic medical records and archived panoramic radiographs. Demographic characteristics (age) and clinical records were extracted and analyzed.

Assessment of the DMFT Index

Oral health status was retrospectively evaluated through a combined assessment of electronic dental records and archived digital panoramic radiographs. The DMFT index was calculated according to the criteria described in the World Health Organization (WHO) Oral Health Surveys: Basic Methods (5th Edition). For each participant, the numbers of decayed (D), missing (M), and filled (F) teeth were recorded separately, and the DMFT index was calculated as the sum of these three components.

Radiographic assessments were performed by evaluating existing restorations, dental caries, and missing teeth on panoramic radiographs. Radiographic findings were subsequently verified by comparison with the corresponding clinical examination records documented in the electronic medical records. Clinical records were primarily used to confirm the presence of restorative treatments, previous tooth extractions, and findings that could not be reliably determined from panoramic radiographs alone. This combined approach was adopted to minimize potential misclassification associated with radiographic assessment alone.

The decayed (D) component included teeth documented as having active dental caries in the clinical records and presenting radiographic findings consistent with carious lesions. The missing (M) component comprised teeth confirmed in the clinical records to have been extracted because of dental caries or periodontal disease. The filled (F) component included teeth restored due to dental caries that remained present in the oral cavity at the time of assessment.

Third molars were excluded from the analysis in accordance with WHO recommendations because of variations in eruption patterns, the prevalence of congenital absence, and differences in extraction indications among individuals. Their exclusion was intended to improve standardization and enhance the comparability of DMFT scores across participants.

All radiographic evaluations were performed by the same investigator, who was experienced in oral and maxillofacial radiology, using standardized WHO diagnostic criteria. All digital panoramic radiographs were

reviewed under identical viewing conditions using the same image analysis software. To ensure methodological consistency, the same evaluation protocol was applied to all participants throughout the study.

To assess intra-observer reliability, 20 randomly selected panoramic radiographs, representing 20% of the study sample, were re-evaluated by the same investigator two weeks after the initial assessment. Agreement between the first and second evaluations was analyzed using Cohen's kappa coefficient. The high intra-observer agreement ($\kappa = 0.86$) confirmed the consistency of the radiographic assessments and supported the reliability of the collected data.

Table 1. Key characteristics of the psychiatric assessment scales used in the study

Scale	Number of Items	Subscales / Assessed Domains	Scoring
PANSS (Positive and Negative Syndrome Scale)	30	Positive Symptoms (7 items): Delusions, conceptual disorganization, hallucinatory behavior, excitement, grandiosity, suspiciousness/persecution, hostility. Negative Symptoms (7 items): Blunted affect, emotional withdrawal, poor rapport, passive/apathetic social withdrawal, difficulty in abstract thinking, lack of spontaneity and flow of conversation, stereotyped thinking. General Psychopathology (16 items): Somatic concern, anxiety, guilt feelings, tension, mannerisms/posturing, depression, motor retardation, uncooperativeness, unusual thought content, disorientation, poor attention, lack of judgment and insight, disturbance of volition, poor impulse control, preoccupation, active social avoidance.	Each item is scored from 1 (absent) to 7 (extreme). Total score ranges from 30 to 210.
HAMD (Hamilton Depression Rating Scale)	17	Depressed mood, feelings of guilt, suicidal thoughts, insomnia (early, middle, late), work and activities, psychomotor retardation, agitation, psychic anxiety, somatic anxiety, gastrointestinal symptoms, general somatic symptoms, genital symptoms, hypochondriasis, weight loss, and insight.	Items are scored 0–2 or 0–4 depending on the item. Total score ranges from 0 to 52.
YMRS (Young Mania Rating Scale)	11	Elevated mood, increased motor activity/energy, sexual interest, sleep, irritability, speech (rate and amount), language/thought disorder, thought content, disruptive/aggressive behavior, appearance, and insight.	Four items are scored 0–8, and the remaining items are scored 0–4. Total score ranges from 0 to 60.

Assessment of Psychiatric Scales

Psychiatric assessment scale scores recorded in the electronic medical records were retrospectively reviewed to evaluate disease severity in the psychotic disorder group. The psychiatric assessment scales used in this study were administered as part of routine clinical practice by board-certified psychiatrists in the Department of Psychiatry, Hatay Mustafa Kemal University Faculty of Medicine, during the participants' hospitalization between 2020 and 2025.

No additional psychiatric assessments were performed specifically for the purposes of this study. Instead, only the psychiatric assessment scores available in the electronic medical records were analyzed. For each participant, the PANSS, HAMD, and YMRS scores corresponding to the hospitalization period during which the panoramic radiograph had been obtained were included in the analysis. This approach ensured that the oral health assessment and psychiatric symptom evaluation reflected the same clinical period.

The Positive and Negative Syndrome Scale (PANSS) was used to assess the severity of psychotic symptoms. The PANSS is a clinician-administered, validated, and reliable instrument developed to evaluate symptom severity in patients with schizophrenia and other psychotic disorders. It consists of 30 items grouped into three subscales: positive symptoms, negative symptoms, and general psychopathology. Each item is rated on a 7-point scale, resulting in a total score ranging from 30 to 210, with higher scores indicating greater symptom severity.

Depressive symptom severity was assessed using the 17-item Hamilton Depression Rating Scale (HAMD-17). The HAMD evaluates the principal clinical manifestations of depression, including depressed mood, feelings of guilt, suicidal ideation, sleep disturbances, anxiety, psychomotor changes, and somatic symptoms. Higher total scores indicate more severe depressive symptoms.

The Young Mania Rating Scale (YMRS) was used to evaluate the severity of manic symptoms. The YMRS is an 11-item clinician-administered instrument specifically developed for the assessment of manic symptoms in patients with bipolar disorder. The scale evaluates several clinical domains, including elevated mood, motor activity, speech, irritability, sleep, thought content, aggressive behavior, and insight. Higher YMRS scores indicate greater severity of manic symptoms.

The Turkish validity and reliability of the PANSS were established by Kostakoğlu et al. (1999), who reported high internal consistency and high interrater reliability (intraclass correlation coefficients), along with confirmed construct validity based on an inverse correlation between the positive and negative symptom subscales. The Turkish version of the HAMD was validated by Akdemir et al. (1996), demonstrating adequate internal consistency, split-half reliability, test–retest reliability, and interrater reliability. The Turkish version of the YMRS was validated by Karadağ et al. (2001) against the Bech–Rafaelsen Mania Scale, showing good interrater reliability and concurrent validity. As the DMFT index is a standardized, language-independent clinical and radiographic measure rather than a self-report or clinician-rated questionnaire, a separate Turkish-language validation was not applicable.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows (Version 22.0; IBM Corp., Armonk, NY, USA). Continuous variables were summarized as mean ± standard deviation (SD). The distribution of continuous variables was assessed using the Shapiro–Wilk test. Age was compared between the psychiatric and control groups using Welch's independent-samples t test. The numbers of decayed (D), missing (M), and filled (F) teeth and total DMFT scores were compared between groups using the Mann–Whitney U test.

Within the psychiatric group, associations between psychiatric symptom severity, as assessed by the PANSS, HAMD, and YMRS, and oral health parameters (D, M, F, and DMFT) were evaluated using Spearman's rank correlation coefficient (ρ). To account for multiple comparisons, p values obtained from the correlation analyses were adjusted using the Benjamini–Hochberg false discovery rate (FDR) procedure.

Because D, M, F, and DMFT represent non-negative count outcomes, separate negative binomial regression models were used to evaluate differences in oral health parameters between the psychiatric and control groups after adjustment for age. Group status (psychiatric vs. control) was entered as the primary independent variable, and age was included as a covariate. Results are reported as incidence rate ratios (IRRs) with 95% confidence intervals (CIs). A multivariable negative binomial regression analysis was additionally performed within the psychiatric group to evaluate factors independently associated with DMFT. Age, PANSS, HAMD, and YMRS scores were entered simultaneously as predictors. These variables were selected a priori based on their previously established associations with oral health outcomes in the existing literature, rather than through a stepwise or data-driven selection procedure, in order to minimize the risk of overfitting given the sample size. Adjusted IRRs with 95% CIs and corresponding p values are reported. Intra-observer agreement between the initial and repeated radiographic assessments was evaluated using Cohen's kappa coefficient. All statistical tests were two-sided, and a p value < 0.05 was considered statistically significant. For the correlation analyses, statistical significance was determined using FDR-adjusted p values.

Results

A total of 100 individuals were included in this study, comprising 50 patients with psychotic disorders and 50 healthy controls. The demographic characteristics and oral health parameters of the study groups are

presented in Table 2. No statistically significant difference in age was observed between the psychiatric and control groups (36.32 ± 10.12 vs. 33.94 ± 10.86 years, p = 0.260).

Intra-observer reliability was assessed by re-evaluating 20 randomly selected panoramic radiographs representing 20% of the study sample. Excellent agreement was observed between the initial and repeated assessments (Cohen's $\kappa = 0.86$).

Analysis of oral health parameters revealed that the psychiatric group had significantly higher numbers of decayed teeth (D; 5.50 ± 4.94 vs. 1.64 ± 1.55, p < 0.001) and missing teeth (M; 4.74 ± 4.69 vs. 0.88 ± 1.14, p < 0.001), as well as significantly higher total DMFT scores (14.86 ± 7.92 vs. 4.78 ± 1.98, p < 0.001), than the control group. In the unadjusted comparison, no statistically significant difference was observed in the number of filled teeth (F) between the psychiatric and control groups (4.62 ± 4.85 vs. 2.26 ± 1.32, p = 0.220) (Table 2).

Table 2. Comparison of demographic characteristics and oral health parameters between patients with psychotic disorders and healthy controls

Variable	Psychiatric group (n=50)	Control group (n=50)	p value
Age, years	36.32 ± 10.12	33.94 ± 10.86	0.260
Decayed teeth (D)	5.50 ± 4.94	1.64 ± 1.55	<0.001
Missing teeth (M)	4.74 ± 4.69	0.88 ± 1.14	<0.001
Filled teeth (F)	4.62 ± 4.85	2.26 ± 1.32	0.220
DMFT	14.86 ± 7.92	4.78 ± 1.98	<0.001

DMFT, decayed, missing, and filled teeth index. Data are presented as mean ± standard deviation. Age was compared using Welch's independent-samples t test. D, M, F, and DMFT were compared using the Mann–Whitney U test.

Table 3. Correlation coefficients between psychiatric symptom severity and oral health parameters in the psychiatric group (n = 50)

Clinical Scale	D	M	F	DMFT
YMRS	$\rho = 0.287$ FDR p = 0.063	$\rho = 0.248$ FDR p = 0.101	$\rho = 0.194$ FDR p = 0.188	$\rho = 0.366$ FDR p = 0.016
PANSS	$\rho = 0.696$ FDR p < 0.001	$\rho = 0.653$ DR p < 0.001	$\rho = 0.411$ FDR p = 0.006	$\rho = 0.805$ FDR p < 0.001
HAMD	$\rho = 0.389$ FDR p = 0.011	$\rho = 0.301$ FDR p = 0.054	$\rho = 0.208$ FDR p = 0.176	$\rho = 0.485$ FDR p = 0.002

YMRS, Young Mania Rating Scale; PANSS, Positive and Negative Syndrome Scale; HAMD, Hamilton Depression Rating Scale; FDR, false discovery rate; D, decayed teeth; M, missing teeth; F, filled teeth; DMFT, decayed, missing, and filled teeth index. Correlations were assessed using Spearman's rank correlation coefficient. P values were adjusted using the Benjamini–Hochberg false discovery rate procedure.

Table 4. Age-adjusted negative binomial regression models comparing psychiatric patients with healthy controls

Outcome	Adjusted IRR (Psychiatric vs. Control)	95% CI	p value
Decayed teeth (D)	3.135	2.084–4.716	<0.001
Missing teeth (M)	5.458	3.458–8.615	<0.001
Filled teeth (F)	1.867	1.266–2.752	0.002
DMFT	3.011	2.439–3.719	<0.001

IRR, incidence rate ratio; CI, confidence interval; DMFT, decayed, missing, and filled teeth index

Correlation analyses performed within the psychiatric group are presented in Table 3. After adjustment for multiple comparisons using the Benjamini–Hochberg false discovery rate procedure, PANSS scores showed a strong positive correlation with the DMFT index ($\rho = 0.805$, FDR-adjusted p < 0.001). PANSS scores were also significantly positively correlated with decayed teeth ($\rho = 0.696$, FDR-adjusted p < 0.001), missing teeth ($\rho = 0.653$, FDR-adjusted p < 0.001), and filled teeth ($\rho = 0.411$, FDR-adjusted p = 0.006).

HAMD scores showed a moderate positive correlation with the DMFT index ($\rho = 0.485$, FDR-adjusted p = 0.002) and a positive correlation with the number of decayed teeth ($\rho = 0.389$, FDR-adjusted p = 0.011). The correlations between HAMD scores and missing teeth ($\rho = 0.301$, FDR-adjusted p = 0.054) and filled teeth ($\rho = 0.208$, FDR-adjusted p = 0.176) were not statistically significant.

YMRS scores showed a positive correlation with the DMFT index (ρ = 0.366, FDR-adjusted p = 0.016). However, correlations between YMRS scores and the individual D (ρ = 0.287, FDR-adjusted p = 0.063), M (ρ = 0.248, FDR-adjusted p = 0.101), and F components (ρ = 0.194, FDR-adjusted p = 0.188) did not reach statistical significance.

Age-adjusted negative binomial regression analyses are presented in Table 4. After adjustment for age, patients with psychotic disorders had significantly higher counts of decayed teeth (IRR = 3.135, 95% CI: 2.084–4.716, p < 0.001), missing teeth (IRR = 5.458, 95% CI: 3.458–8.615, p < 0.001), and filled teeth (IRR = 1.867, 95% CI: 1.266–2.752, p = 0.002) compared with healthy controls. The overall DMFT count was approximately three times higher in the psychiatric group after adjustment for age (IRR = 3.011, 95% CI: 2.439–3.719, p < 0.001).

In the multivariable negative binomial regression analysis restricted to the psychiatric group (Table 5), PANSS score was independently associated with DMFT (adjusted IRR = 1.016, 95% CI: 1.012–1.019, p < 0.001). In contrast, age (adjusted IRR = 1.003, 95% CI: 0.992–1.015, p = 0.56), YMRS score (adjusted IRR = 1.009, 95% CI: 0.994–1.024, p = 0.24), and HAMD score (adjusted IRR = 1.004, 95% CI: 0.985–1.024, p = 0.67) were not independently associated with DMFT.

Table 5. Multivariable negative binomial regression analysis of factors associated with DMFT in psychiatric patients (n = 50)

Predictor	Adjusted IRR	95% CI	p value
Age	1.003	0.992–1.015	0.56
YMRS	1.009	0.994–1.024	0.24
PANSS	1.016	1.012–1.019	<0.001
HAMD	1.004	0.985–1.024	0.67

DMFT, decayed, missing, and filled teeth index; IRR, incidence rate ratio; CI, confidence interval; YMRS, Young Mania Rating Scale; PANSS, Positive and Negative Syndrome Scale; HAMD, Hamilton Depression Rating Scale..

Discussion

The present study evaluated the association between oral health parameters and psychiatric symptom severity in individuals with psychotic disorders. The findings demonstrated that patients with psychotic disorders had significantly higher DMFT scores, as well as greater numbers of decayed and missing teeth, than healthy controls. These results are consistent with previous studies reporting substantially poorer oral health among individuals with severe mental illness (Gurbuz et al. 2010, Kisely et al. 2011, Kisely et al. 2015, Velasco-Ortega et al. 2017).

The elevated DMFT scores observed in patients with psychotic disorders were characterized by substantial contributions from both the decayed and missing teeth components. Gurbuz et al. (2010) reported poor oral health and substantial treatment needs among institutionalized chronic psychiatric patients. Similarly, McCreadie et al. (2004) and Bertaud-Gounot et al. (2013) documented a considerable burden of dental disease and tooth loss among patients with severe mental illness. Collectively, these findings indicate that both untreated dental disease and tooth loss contribute substantially to the overall oral disease burden in individuals with psychotic disorders.

In the unadjusted comparison, the number of filled teeth did not differ significantly between the psychiatric and control groups. However, after adjustment for age using negative binomial regression, the psychiatric group had a significantly higher filled-teeth count. This finding indicates that the relationship between psychiatric status and the filled component of the DMFT index differed according to the analytical approach used and should therefore be interpreted cautiously. Previous studies have reported heterogeneous patterns of restorative dental treatment among individuals with severe mental illness, with differences potentially reflecting variations in access to dental care, treatment history, and study populations (Chu et al. 2012, Velasco-Ortega et al. 2017).

Limited utilization of dental care services represents another important factor contributing to poor oral health in individuals with psychotic disorders. Teng et al. (2016) demonstrated that patients with severe mental illness have significantly lower rates of dental service utilization than the general population. Likewise, Kilbourne et al. (2007) reported barriers related to oral healthcare among individuals with serious mental illness. Consequently, inadequate utilization of preventive and restorative dental care may increase the likelihood of untreated dental disease and subsequent tooth loss.

One of the most notable findings of the present study was the strong association between psychiatric symptom severity and oral health. The significant positive correlation observed between PANSS scores and the DMFT index indicates that greater psychotic symptom severity was associated with poorer oral health. Furthermore, the significant associations between PANSS scores and each of the individual DMFT components suggest that this relationship was not confined to a single aspect of oral health but rather reflected a broader association across multiple oral health parameters. Consistent with our findings, Arnaiz et al. (2011) also reported significant associations between schizophrenia symptom severity and oral health status.

The moderate positive correlation observed between HAMD scores and the DMFT index further supports a potential association between depressive symptom severity and oral health. Depression may contribute to reduced motivation and impaired self-care behaviors; however, the present retrospective findings do not establish a causal mechanism. The observed association between HAMD scores and oral health should therefore be interpreted as an association rather than evidence of a direct causal effect. However, HAMD was not independently associated with DMFT in the multivariable negative binomial regression model that included age, PANSS, HAMD, and YMRS. Similarly, although YMRS was significantly correlated with DMFT in the bivariate analysis, this association did not remain statistically significant after multivariable adjustment. In contrast, PANSS remained independently associated with DMFT, suggesting that psychotic symptom severity showed the most robust association with overall dental disease burden among the psychiatric symptom dimensions evaluated in this study.

The significantly higher DMFT scores, particularly the increased numbers of decayed and missing teeth observed in patients with psychotic disorders, may reflect the contribution of multiple clinical, pharmacological, and behavioral factors. Psychotropic medications commonly prescribed for psychotic disorders have been associated with oral adverse effects, including alterations in salivary function and xerostomia, which may increase susceptibility to dental caries. Furthermore, metabolic disturbances associated with second-generation antipsychotics, together with dietary and behavioral factors and difficulties in maintaining adequate self-care, may contribute to poor oral health. However, medication type, dosage, and duration of treatment were not specifically analyzed in the present study; therefore, the contribution of psychopharmacological treatment to the observed DMFT scores cannot be directly determined. Nevertheless, previous evidence has highlighted both the oral adverse effects associated with psychotropic medications and the substantial oral health challenges experienced by individuals with severe mental illness (Mortimer et al. 2023, Afroz et al. 2025, Sharma et al. 2025, Urien et al. 2025).

The present study has several strengths. First, patients with psychotic disorders were compared with an age- and sex-matched healthy control group. Second, important confounding factors known to influence oral health, including smoking and diabetes mellitus, were excluded. Third, psychiatric symptom severity was comprehensively evaluated using the PANSS, HAMD, and YMRS. Furthermore, all radiographic assessments were performed by a single experienced examiner, and the high intra-observer agreement (κ = 0.86) supports the methodological reliability and consistency of the study. Nevertheless, several limitations should be acknowledged. The retrospective design and reliance on existing clinical records may have limited the availability and completeness of some clinical data and preclude causal inference. The single-center design and inclusion of hospitalized patients may limit the generalizability of the findings. In addition, unmeasured factors such as psychiatric illness duration, medication exposure, oral hygiene practices, and socioeconomic characteristics may have influenced the observed associations. These limitations should be considered when interpreting the association between psychiatric symptom severity and oral health.

Conclusion

The present study demonstrated that individuals with psychotic disorders exhibited significantly poorer oral health than healthy controls, characterized by higher DMFT scores and substantially greater numbers of decayed and missing teeth. These findings indicate a considerable burden of dental disease among individuals with psychotic disorders. An important finding of this study was the association between psychiatric symptom severity and oral health. PANSS, HAMD, and YMRS scores were significantly correlated with the DMFT index in bivariate correlation analyses. However, in the multivariable negative binomial regression model including age and all three psychiatric symptom scales, only PANSS remained independently associated with DMFT. This finding suggests that psychotic symptom severity showed the most robust independent association with overall dental disease burden among the psychiatric symptom dimensions evaluated. Given the retrospective nature of the study, causal relationships cannot be inferred.

Overall, these findings emphasize the potential value of integrated models of care involving close collaboration between psychiatry and dentistry. Routine oral health assessment, preventive dental care, and regular dental follow-up may be beneficial components of the long-term management of individuals with psychotic disorders. Such multidisciplinary strategies may contribute to improving oral health outcomes and reducing the burden of dental disease in this population. Future prospective, multicenter studies with larger samples are needed to confirm these findings and further clarify the relationship between psychiatric symptom severity and oral health. Such studies should also evaluate the potential contributions of illness duration, psychotropic medication exposure, oral hygiene practices, and socioeconomic factors to oral disease burden in individuals with psychotic disorders.

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