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Original Article

Oral Health Status in Patients with Depression and Anxiety: A Descriptive Cross-Sectional Study

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Abstract

Background: Depression and anxiety are among the most prevalent mental health disorders worldwide and are increasingly recognized as conditions that adversely influence physical health, including oral health. Through behavioral changes, medication side effects, and lifestyle factors, these disorders may predispose individuals to poor oral hygiene, dental caries, and periodontal disease.

Objective: To assess the oral health status of patients suffering from depression and anxiety.

Methodology: A descriptive cross-sectional study was conducted among 116 patients attending the Psychiatry Department of Saidu Group of Teaching Hospital, Swat. Participants diagnosed with depression or anxiety were enrolled using non-probability consecutive sampling. Depression and anxiety severity were assessed using the Patient Health Questionnaire-9 (PHQ-9) and Generalized Anxiety Disorder-7 (GAD-7) scales, respectively. Oral health was evaluated using the Decayed, Missing, and Filled Teeth (DMFT) index, Gingival Index, and Periodontal Index. Statistical analysis included Pearson correlation, one-way ANOVA, and Student's t-test.

Results: The mean age of participants was 32.76 ± 9.47 years, with females comprising 57.76% of the sample. Strong positive correlations were observed between DMFT scores and depression ($r = 0.97$, $p < 0.001$) as well as anxiety ($r = 0.97$, $p < 0.001$). Gingival index and pocket depth were also significantly correlated with both depression and anxiety ($p < 0.001$). Oral health parameters deteriorated significantly with increasing severity of depression, whereas no significant differences were observed between moderate and severe anxiety groups.

Conclusion: Depression and anxiety are strongly associated with poor oral health outcomes. Integrating oral health assessment and preventive dental care into mental health services may improve overall health outcomes in this vulnerable population.

Keywords: Anxiety, Cross-sectional study, Depression, DMFT, Gingival Index, Oral Health, Periodontal Index.

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Introduction

Chronic mental illnesses are long-term health conditions characterized by persistent disturbances in mood, cognition, and behavior, leading to significant impairment in daily functioning. Among these, depression and anxiety disorders are highly prevalent and represent a major public health challenge worldwide. Depression affects approximately 4.4% of the global population [1], while in Pakistan its prevalence is substantially higher, ranging between 22% and 60% [2]. Anxiety disorders are characterized by excessive fear and worry that interfere with routine activities, whereas depression is marked by prolonged sadness, hopelessness, and loss of interest in daily life [3].

Oral health plays a vital role in overall health and quality of life. Poor oral hygiene facilitates plaque accumulation, which is a key factor in the initiation and progression of dental caries and periodontal diseases [4]. Periodontal disease typically begins as gingivitis, a reversible inflammatory condition; however, if untreated, it may progress to periodontitis, an irreversible condition associated with attachment loss, increased pocket depth, and eventual tooth loss [5]. Both dental caries and periodontal disease can cause pain, functional impairment, and reduced quality of life if not appropriately managed [6].

Patients with mental health disorders are particularly vulnerable to poor oral health. Psychological distress, reduced motivation, and impaired self-care behaviors often result in inadequate oral hygiene practices and delayed dental visits. Evidence suggests that the strongest association between mental illness and poor oral health is observed among individuals with severe mental disorders [7]. Such individuals are nearly three times more likely to experience complete tooth loss compared to the general population (OR = 2.8; 95% CI = 1.7–4.5) [8].

Multiple mechanisms contribute to this association. Psychotropic medications commonly prescribed for depression and anxiety frequently cause xerostomia, which increases the risk of dental caries and oral infections [9]. Additionally, barriers to dental care such as low socioeconomic status, lack of awareness, personal neglect, and limited access to oral health services further exacerbate oral health problems. Behavioral factors, including tobacco use, poor dietary habits, and increased consumption of sugary foods, also play a contributory role [10].

Despite extensive literature on the prevalence and clinical features of depression and anxiety [1,2], local data exploring their relationship with oral health status remain limited. Understanding this association within the Pakistani population is essential for developing integrated healthcare strategies that address both mental and oral health. Therefore, this study aimed to determine the oral health status of patients suffering from depression and anxiety.

Methodology

Study Design

This study employed a descriptive cross-sectional design to evaluate the association between oral health status and the severity of depression and anxiety among adult psychiatric patients. The design was selected to allow simultaneous assessment of mental health status and oral health indicators within a defined clinical population over a fixed period.

Ethics

Ethical approval was obtained from the institutional Ethical Review Board prior to initiation of the study (Approval No. 57-ERB/SMC/025). All participants were informed about the study objectives, procedures, potential benefits, and confidentiality of data. Written informed consent was obtained from each participant before enrollment, in accordance with the principles of the Declaration of Helsinki.

Setting

The study was conducted in the Department of Psychiatry at Saidu Group of Teaching Hospital, Swat, Pakistan. Data collection took place over a seven-month period, from 10 February 2024 to 10 September 2024. The hospital serves as a major tertiary care center for the region, receiving patients from both urban and rural backgrounds.

Participants

A total of 116 patients were recruited using a non-probability consecutive sampling technique. Eligible participants were Pakistani nationals aged 18 years or older with a clinical diagnosis of depression or anxiety. Patients with severe cognitive impairment, unrelated oral health conditions, a history of major dental procedures within the preceding six months, or current substance abuse known to affect oral health were excluded from the study.

Variables

The primary outcome variables were oral health indicators, including the Decayed, Missing, and Filled Teeth (DMFT) index, Gingival Index (GI), and Periodontal Index (PI). The primary explanatory variables were depression and anxiety severity, assessed using standardized psychometric tools.

Sociodemographic variables, including age and gender, were recorded as descriptive covariates.

Data Sources/Measurement

Oral health assessments were conducted by a single calibrated examiner to minimize inter-examiner variability. Clinical examinations were performed using disposable mouth mirrors and dental probes under standard infection control precautions.

The Gingival Index was used to assess gingival inflammation at four sites per tooth (mesial, distal, buccal, and lingual), scored on a scale from 0 to 3, with mean scores calculated per participant. The Periodontal Index evaluated pocket depth and attachment loss at six sites per tooth, with scores ranging from 0 (healthy) to 8 (severe periodontal disease). Dental caries experience was assessed using the DMFT index by recording the number of decayed, missing, and filled teeth. Depression severity was measured using the Patient Health Questionnaire-9 (PHQ-9), with scores ranging from 0 to 27; a score ≥10 indicated probable major depressive disorder. Anxiety severity was assessed using the Generalized Anxiety Disorder-7 (GAD-7) scale, with scores ≥10 indicating clinically significant anxiety. Both tools are validated and widely used in clinical and research settings.

Bias

To reduce measurement bias, all oral examinations were conducted by the same trained examiner using standardized assessment criteria. Validated and standardized instruments (PHQ-9 and GAD-7) were used to assess depression and anxiety, minimizing information bias. However, due to the cross-sectional design and non-probability sampling, selection bias and residual confounding cannot be entirely excluded.

Study Size

The sample size of 116 participants was calculated using OpenEpi software, assuming an 18% prevalence of poor oral health among individuals with mental illness, a 95% confidence level, and a margin of error of 7%, based on previously published literature.

Quantitative Variables

Continuous variables, including age, DMFT scores, gingival index scores, periodontal index scores, and psychometric scale scores, were treated as quantitative variables and summarized using means and standard deviations. Categorical variables such as gender and severity categories of depression and anxiety were expressed as frequencies and percentages.

Statistical Methods

Data analysis was performed using R software version 4.3.2. Normality of continuous variables was assessed using the Shapiro–Wilk test and found to be normally distributed. Pearson correlation coefficients were calculated to examine associations between depression and anxiety scores and oral health indicators (DMFT, GI, and pocket depth). One-way analysis of variance (ANOVA) was used to compare oral health outcomes across different levels of depression severity, while Welch's two-sample t-test was applied to compare oral health outcomes between moderate and severe anxiety groups. A p-value of less than 0.05 was considered statistically significant.

Results

Participants

A total of 116 participants diagnosed with depression and/or anxiety were included in the final analysis. All enrolled participants met the eligibility criteria and completed both the psychiatric assessment and oral health examination. There were no missing data for the primary outcome variables, and all participants were included in the statistical analyses.

Descriptive Data

The mean age of the participants was 32.76 ± 9.47 years. Females constituted the majority of the sample, with 67 participants (57.76%), while 49 participants (42.24%) were male. Regarding the severity of depression, 49 participants (42.24%) were classified as having mild depression, 39 (33.62%) had moderate depression, and 28 (24.14%) had severe depression. In terms of anxiety severity, 68 participants (58.62%) experienced moderate anxiety, while 48 participants (41.38%) were classified as having severe anxiety. Detailed demographic and clinical characteristics of the study population are presented in Table 1.

Outcome Data

Oral health outcomes were assessed using the Decayed, Missing, and Filled Teeth (DMFT) index, Gingival Index, and periodontal pocket depth measurements. All oral health indicators showed worsening trends with increasing severity of depression and anxiety. Pearson correlation analysis demonstrated statistically significant associations between psychiatric symptom severity and all oral health indices. DMFT scores exhibited a very strong positive correlation with both depression and anxiety scores. Similarly, gingival index and pocket depth measurements showed strong positive correlations with depression and anxiety, indicating deteriorating gingival and periodontal health as psychiatric symptom severity increased (Table 2).

Main Results

Comparative analysis revealed a significant gradient in oral health deterioration across different levels of depression severity. Participants with severe depression demonstrated markedly higher mean DMFT scores, gingival index values, and pocket depth measurements compared to those with moderate and mild depression. One-way ANOVA confirmed that these differences were statistically significant across all oral health parameters ($p < 0.001$). The DMFT score increased progressively from mild to severe depression, reflecting a substantial increase in caries experience and tooth loss. Similarly, gingival inflammation and periodontal pocket depth worsened significantly with increasing depression severity (Table 3, Figure 1). In contrast, when oral health outcomes were compared between participants with moderate and severe anxiety, no statistically significant differences were observed. Mean DMFT scores, gingival index values, and pocket depth measurements were comparable between the two anxiety groups, as confirmed by Welch's two-sample t-test. These findings suggest that while anxiety is strongly associated with poor oral health, increasing anxiety severity beyond a moderate level does not appear to further exacerbate oral health outcomes within this sample (Table 4).

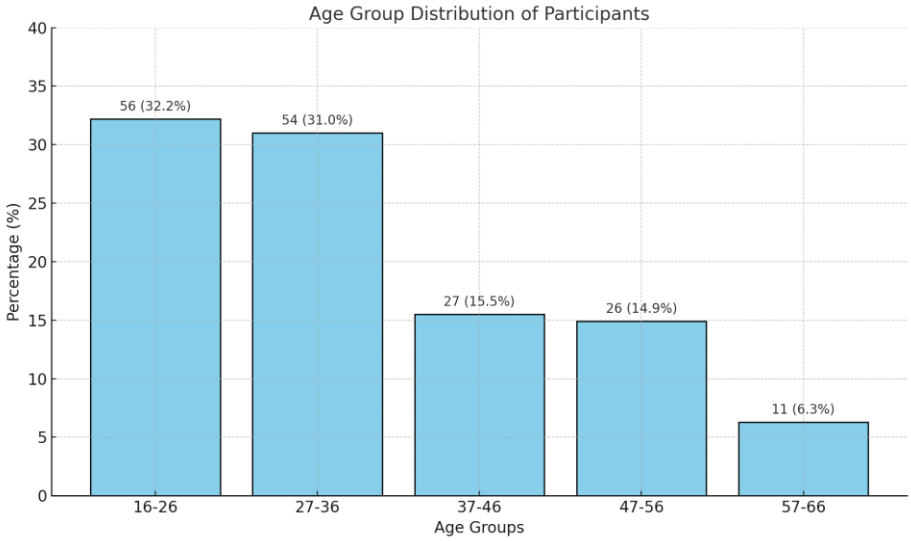


Figure 1: Age distribution of the participants

Table 1: Distribution of age, gender, depression and anxiety among the participants

Characteristic	N = 116
Age(years), Mean ± SD	32.76 ± 9.47
Gender, n (%)	
Female	67 (57.76)
Male	49 (42.24)
Depression type, n (%)	
Mild	49 (42.24)
Moderate	39 (33.62)
Severe	28 (24.14)
Anxiety type, n (%)	
Moderate	68 (58.62)
Severe	48 (41.38)

Table 2: Correlation of DMFT, gingival index and pocket depth with depression and anxiety

Variable	Correlation	Statistic	p	95% CI
DMFT versus depression	0.97	42.51	<0.001	0.95, 0.97
gingival index versus depression	0.9	21.84	<0.001	0.85, 0.93
Pocket depth versus depression	0.95	31.64	<0.001	0.92, 0.96
DMFT versus anxiety	0.97	42.76	<0.001	0.95, 0.97
gingival index versus anxiety	0.9	22.30	<0.001	0.86, 0.93
Pocket depth versus anxiety	0.91	23.82	<0.001	0.87, 0.94

*Pearson correlation test; DMFT, Decayed missing and filled teeth

Table 3: Comparison of oral health status among type of depression

Oral health status	Type of Depression			p-value**
	Mild, N = 49	Moderate, N = 39	Severe, N = 28	
DMFT score	10.78 ± 3.69	18.31 ± 1.66	24.86 ± 2.45	<0.001
gingival index score	1.82 ± 0.40	2.55 ± 0.13	2.89 ± 0.12	<0.001
Pocket depth score	2.83 ± 0.91	5.09 ± 0.60	7.37 ± 1.10	<0.001

*Mean ± SD; **One-way ANOVA

Table 4: Comparison of oral health status among type of anxiety

Oral health status	Pattern of Anxiety		p-value*
	Moderate, N = 68	Severe, N = 48	
DMFT score	16.37 ± 6.22	17.19 ± 6.51	0.49
gingival index score	2.32 ± 0.51	2.33 ± 0.56	0.99
Pocket depth score	4.63 ± 2.04	4.77 ± 1.97	0.67

*Welch Two Sample t-test

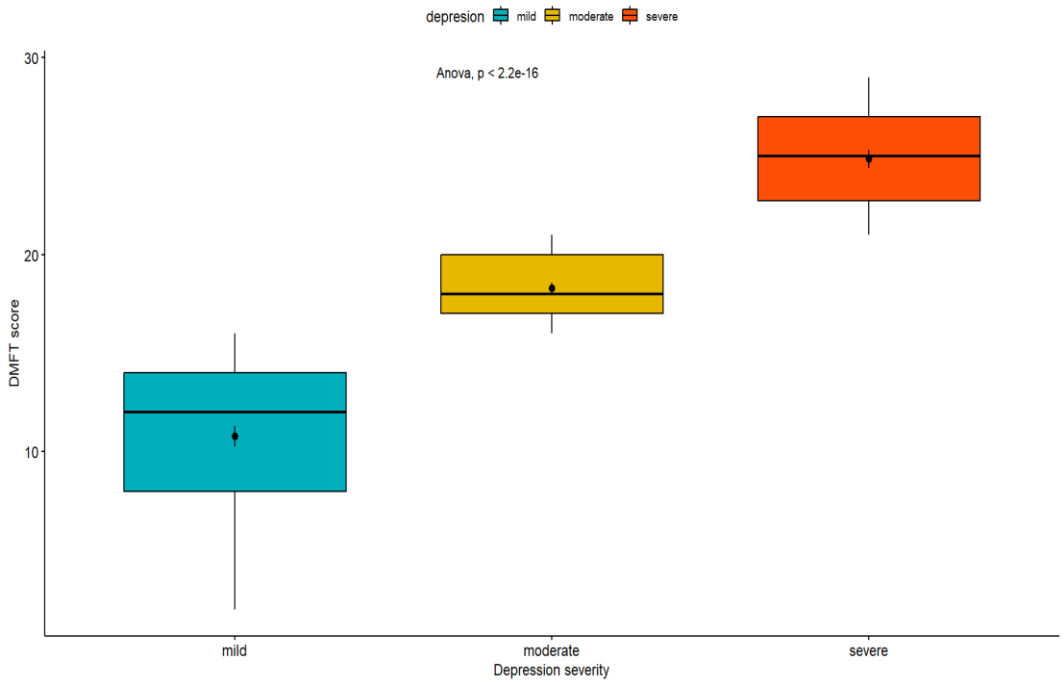


Figure 2: DMFT score in various depression type

Discussion

The present study demonstrates a strong association between poor oral health and increasing severity of depression and anxiety among adult psychiatric patients. The findings highlight that higher levels of depressive and anxiety symptoms are accompanied by significantly worse oral health indicators, including increased DMFT scores, higher gingival index values, and greater periodontal pocket depth. These results support the growing body of evidence linking mental health disorders with compromised oral health status.

The exceptionally strong correlations observed between DMFT scores and both depression and anxiety indicate that dental caries experience and tooth loss increase substantially with worsening psychiatric symptoms. This association may be explained by behavioral and psychosocial factors commonly observed in individuals with mental illness, such as neglect of personal hygiene, irregular dental visits, unhealthy dietary patterns, and tobacco use. Similar associations between mental health disorders and poor oral health have been reported in previous studies, which found higher caries prevalence and tooth loss among individuals with psychiatric conditions compared to the general population [11-13].

The present study also revealed a clear gradient in oral health deterioration with increasing severity of depression. Participants with severe depression exhibited significantly higher DMFT scores, greater gingival inflammation, and deeper periodontal pockets compared to those with mild and moderate depression. These findings are consistent with earlier research demonstrating that individuals with more severe depressive symptoms experience greater impairment in self-care behaviors, including oral hygiene maintenance, and are more likely to delay or avoid dental care [14]. A large meta-analysis reported that individuals with severe mental illness had nearly threefold higher odds of complete tooth loss and significantly worse dental outcomes, reinforcing the findings of the current study [8].

In contrast, although anxiety was strongly associated with poor oral health outcomes, no statistically significant differences were observed between moderate and severe anxiety groups. This suggests that while anxiety contributes to oral health deterioration, increasing anxiety severity may not proportionally worsen oral health parameters. One possible explanation is that individuals with severe anxiety may retain some degree of health-related vigilance, including oral hygiene practices, due to heightened concern about physical symptoms. Similar observations have been reported in prior systematic reviews, where anxiety disorders were associated with increased caries experience but showed inconsistent relationships with periodontal disease severity [15].

Medication-related factors may also contribute to the observed associations. Psychotropic medications commonly prescribed for depression and anxiety are known to cause xerostomia, which reduces salivary flow and increases susceptibility to dental caries and periodontal disease.[9] Additionally, socioeconomic barriers, lack of oral health awareness, and limited access to dental services further compound oral health challenges in psychiatric populations [16]. Collectively, these factors underscore the multifactorial nature of oral health deterioration in individuals with mental illness.

It is noteworthy that the correlations observed in this study were exceptionally high. While this underscores a strong association between mental health and oral health, it may also reflect residual confounding, as multivariable regression analyses were not performed. This limitation highlights the need for future studies incorporating adjusted models to better elucidate the independent effects of depression and anxiety on oral health outcomes.

Conclusion

This study demonstrates a significant association between depression, anxiety, and poor oral health outcomes among psychiatric patients. Oral health status deteriorated markedly with increasing severity of depression, while anxiety was also strongly associated with compromised dental and periodontal health. Given the cross-sectional design of this study, causal relationships cannot be established. However, the findings emphasize the importance of integrating oral health assessment and preventive dental care into mental health treatment programs. Future longitudinal and interventional studies are warranted to determine whether effective management of depression and anxiety can lead to improvements in oral health status.

Authors' Contributions:

All authors meet the ICMJE criteria for authorship.

Author 1: Substantial contribution to conception and design, drafting the manuscript, final approval, agreed to be accountable for all the work.
Author 2: Substantial contribution to conception and design, data acquisition, drafting the manuscript, final approval, agreed to be accountable for all the work.

Author 3: Analysis and interpretation of data, drafting the manuscript, final approval, agreed to be accountable for all the work.

Author 4: Analysis and interpretation of data, critical revision, final approval, agreed to be accountable for all the work.

Author 5: Substantial contribution to conception and design, drafting the manuscript, final approval, agreed to be accountable for all the work.

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