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Review article

Exploring the Link between Schizophrenia and Periodontal Disease -A systematic Review

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Abstract:

Background: Schizophrenia is a chronic psychiatric disorder often associated with compromised self-care and health outcomes. Emerging evidence suggests a link between schizophrenia and poor oral health, particularly periodontal disease. This systematic review aims to evaluate the association between schizophrenia and periodontal health by analysing clinical outcomes in affected individuals. A comprehensive electronic search was conducted across MEDLINE, PubMed, Scopus, and EMBASE databases using relevant MeSH terms. The search focused on studies published within the last 15 years. Inclusion criteria targeted randomized clinical trials assessing periodontal health in patients diagnosed with schizophrenia. After screening and applying predefined inclusion and exclusion criteria, seven eligible studies were selected. Data extraction was performed using a standardized grid to ensure consistency. The analysis of the selected studies revealed that individuals with schizophrenia consistently exhibit poorer periodontal health compared to the general population. Key contributing factors include medication-induced xerostomia, neglect of oral hygiene, cognitive impairment, and behavioural challenges. Common periodontal parameters such as plaque index, gingival bleeding, and probing depth were significantly worse in the schizophrenia group across studies. This review highlights a clear association between schizophrenia and increased risk of periodontal disease. The findings underscore the importance of integrating dental care into the overall health management of individuals with schizophrenia. Routine periodontal assessments, tailored oral hygiene education, and interdisciplinary collaboration are essential for improving oral health outcomes in this vulnerable population.

Keywords: Schizophrenia; Periodontal disease; Oral health; Systematic review; Psychiatric disorders

Introduction

Periodontal disease is an infectious condition that leads to inflammation of the supporting structures of the teeth, resulting in progressive loss of attachment and bone. It is typically marked by the formation of periodontal pockets and/or gingival recession [(1)]. Research suggests that periodontal disease accounts for approximately 20% of all cases of tooth loss [(2)]. A variety of contributing factors have been identified, including poor oral hygiene, coexisting dental conditions, systemic health issues, certain medications, socio-economic challenges, limited access to dental care, behavioural issues, and reduced motor function [(3)]. Epidemiological studies indicate that periodontitis does not impact everyone equally [(4)]. In fact, while gingivitis is common across the population, only a subset of individuals progress to periodontitis [(5)]. These observations have led to the understanding that certain individuals possess risk factors that increase their susceptibility to developing periodontal disease [(4)].

Schizophrenia is a chronic mental disorder affecting approximately 1% of the global population [(6)], with a higher prevalence reported in Turkey, where around 2% of individuals are diagnosed with the condition [(7)]. People with schizophrenia are at an elevated risk of developing periodontal disease compared to the general population [(8–10)]. This increased vulnerability is attributed to a combination of interrelated factors, including the side effects of antipsychotic medications, poor oral hygiene practices, and a higher prevalence of smoking [(11)]. Previous research has consistently shown that individuals with schizophrenia tend to have poorer oral health, including a significantly higher number of missing teeth compared to those without the disorder [(12,13)].

Despite growing evidence of the bidirectional relationship between systemic diseases and oral health, research specifically investigating the link between schizophrenia and periodontal disease remains limited. This systematic review aims to explore the impact of schizophrenia on periodontal health, including factors such as plaque control, gingival health, and bleeding on probing (BOP). The primary objectives of the review were to evaluate the extent to which schizophrenia contributes to periodontal disease progression.

We investigated the following research questions, framed in PICO (Patient, Intervention, Comparator, Outcome) format: P, adults with schizophrenia; I, presence of periodontal disease; C, absence of periodontal disease; O, association with schizophrenia.

This systematic review was conducted according to a pre-specified protocol, registered in the PROSPERO database CRD420251042603.The review adhered to the methodological guidelines outlined in the Cochrane Handbook for Systematic Reviews and followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards for transparent reporting (Fig. 1).

Following the PRISMA guidelines, this systematic review aimed to synthesize existing evidence on the relationship between schizophrenia and periodontal disease, focusing on periodontal outcomes such as plaque accumulation, gingival inflammation, and BOP. The review was conducted from April 2025 to May 2025, and included studies published between 2009 and 2025. To ensure methodological rigor, the Critical Appraisal Skills Programme checklists were used to independently assess the quality of the included studies. Data extraction was carried out by two independent reviewers, achieving substantial inter-observer agreement (Kappa score: 0.75), ensuring consistency and reliability in the selection and evaluation process.

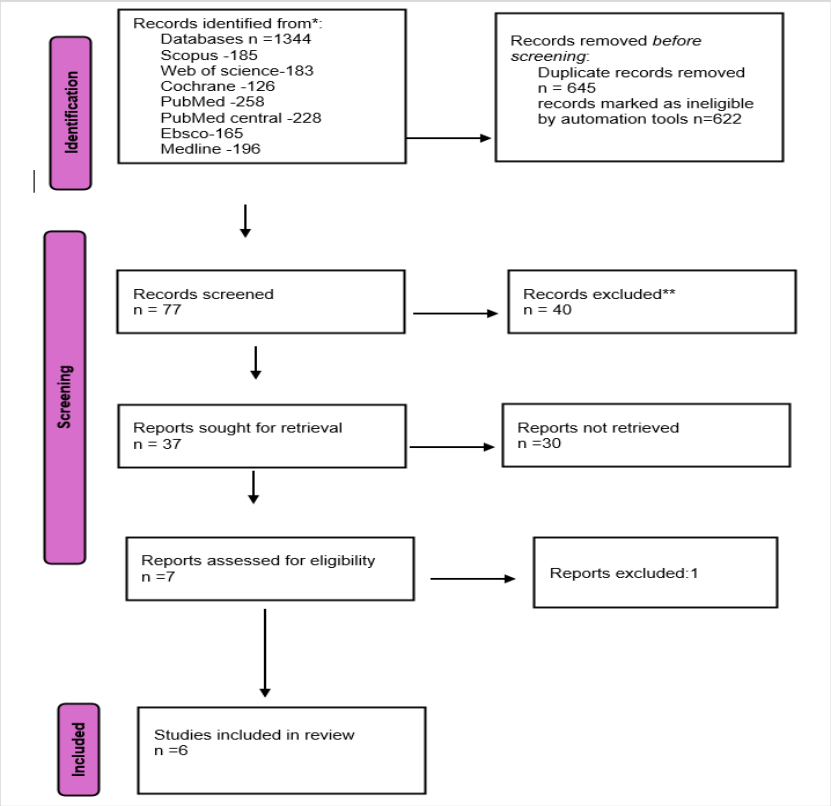

Fig. 1. Preferred Reporting Items for Systematic reviews

Literature search protocol

A personalized data extraction table was developed to systematically collect key information from each study, including study design, population characteristics, periodontal parameters, and findings related to schizophrenia. Two reviewers independently extracted the data, which were then cross verified to ensure consistency and accuracy. Discrepancies were resolved through discussion or consultation with a third reviewer.

A comprehensive literature search was conducted by three independent reviewers across multiple electronic databases: PubMed, EBSCOhost, Scopus, Cochrane Library, Web of Science, and PubMed Central, covering publications from 2009 to 2025. The search strategy combined Medical Subject Headings (MeSH) and keyword terms to capture all relevant studies within the scope of this systematic review.

The following terms were used in various combinations using Boolean operators (AND, OR): “schizophrenia” [MeSH Terms] OR “psychotic disorders” [All Fields] AND “periodontal disease” [MeSH Terms] OR “gingival inflammation” [All Fields] OR “plaque index” [All Fields] AND “oral health” OR “periodontal parameters” OR “bleeding on probing” AND “risk factors” OR “treatment outcomes”.

This search protocol was designed to identify studies evaluating periodontal health status in individuals diagnosed with schizophrenia, with emphasis on clinical outcomes such as gingival index (GI), plaque index (PI), and other periodontal indicators. Additional articles were identified through manual screening of the reference lists of relevant papers.

Eligibility criteria

A rigorous two-phase selection process was used to identify studies for inclusion. In the first phase, titles and abstracts were screened based on predefined eligibility criteria. Only randomized controlled trials (RCTs) published in English, involving human participants diagnosed with schizophrenia, and reporting periodontal health outcomes—such as PI, GI, BOP, or periodontal disease status—were considered eligible.

In the second phase, full-text articles were assessed for methodological quality and relevance. Studies were excluded if they did not meet RCT criteria, lacked full-text availability, had incomplete data, or failed to report clear periodontal outcome measures.

Outcome variables

The primary outcome variables assessed in this systematic review included key clinical indicators of periodontal health. These were: (1) PI, which measures the accumulation of dental plaque on tooth surfaces; (2) GI, which evaluates the severity of gingival inflammation based on colour, texture, and bleeding; (3) BOP, an indicator of gingival inflammation detected by bleeding upon gentle probing; (4) probing pocket depth, which measures the depth of the gingival sulcus or periodontal pocket; and (5) clinical attachment level (CAL), which assesses the position of periodontal attachment relative to the cementoenamel junction.

Additional parameters included the community periodontal index (CPI) and papillary bleeding index, both of which offer standardized approaches to assess periodontal status in population-based studies. These outcome variables provided a comprehensive overview of periodontal disease presence and severity in individuals with schizophrenia.

Results

A comprehensive electronic search across multiple databases initially yielded 1,344 potentially relevant articles. After removing duplicates, 622 publications underwent full-text screening, from which six studies met the inclusion criteria. These selected studies, detailed in the evidence tables by study design and clinical parameters, represent diverse populations and collectively provide valuable insight into the association between schizophrenia and periodontal health. The included research spans various methodological approaches, including microbiological analyses and clinical periodontal assessments, with sample sizes ranging from 35 to 250 participants. Together, they highlight consistent trends indicating poorer periodontal outcomes in patients with schizophrenia compared to healthy controls (Tables 1, 2).

1. Impact of antipsychotic medications on periodontal health

Study findings indicate that patients with schizophrenia who are prescribed antipsychotic medications—especially those that alter salivary flow rate (SFR)—exhibit significantly higher PI and BOP. This suggests that antipsychotic therapy may exacerbate the risk of periodontal disease through altered oral physiology [(16)].

2. Periodontal status in schizophrenic vs. healthy individuals

Compared to healthy controls, schizophrenic patients consistently demonstrated worse periodontal health indicators, including higher GI (2.467), PI (2.402), probing depth (PD: 2.854 mm), and clinical attachment loss (CAL: 1.726 mm). These differences provide convincing evidence to classify schizophrenia as a risk factor for periodontitis and underscore the need for specialized oral healthcare strategies for this population.

3. Community Periodontal Index and Treatment Needs assessment

Patients with schizophrenia showed significantly elevated CPI and Treatment Need (CPITN) scores (2.24 ± 0.98 vs. 1.21 ± 1.10) relative to controls, with

greater occurrence of calculus and periodontal pockets. These findings support calls for enhanced periodontal screening and interventions among psychiatric patients, particularly in institutional settings [18].

4. Duration of schizophrenia and periodontal deterioration

Longer disease duration in schizophrenia was associated with significantly higher gingival and plaque indices, along with deeper periodontal pockets (p<0.001). This pattern points to a possible bidirectional relationship between schizophrenia and periodontal disease [16]. potentially mediated by chronic systemic inflammation and shared cytokine pathways.

5. Gender differences and periodontal breakdown

A substantial proportion of schizophrenic patients exhibited periodontal pockets (69.8%) and loss of attachment (57%), with males having more severe periodontal conditions. These gender disparities indicate a need for tailored interventions and reinforce the critical importance of routine periodontal assessment in this population [17].

6. Microbial imbalance: presence of *Porphyromonas gingivalis*

Using PCR and anaerobic culture, *Porphyromonas gingivalis* was detected in 78% of schizophrenic patients compared to only 17% of controls. Additionally, bacterial load was significantly higher in the schizophrenia group, correlating with symptom severity. These findings reveal a notable microbial dysbiosis in the oral cavity of schizophrenia patients, suggesting diagnostic and therapeutic implications for both dental and psychiatric care [14].

7. Quality assessment

The Cochrane Risk of Bias Tool 2.0 was applied to assess the methodological quality of the included studies. Although this tool is primarily intended for randomized controlled trials, it was judiciously adapted for use with the selected observational and cross-sectional designs. Overall, three studies were rated as having “some concerns” (moderate risk of bias), while the remaining were classified as low risk. The most frequently observed source of bias was related to the randomization process (Domain 1), with four studies demonstrating a high risk in this domain due to unclear or absent random allocation procedures [14–17]

Another notable source of potential bias was in the selection of reported results (Domain 5), where selective outcome reporting was evident in three studies [14–16]. Bias in the measurement of outcomes (Domain 4) also raised concerns in several cases, particularly where outcome assessors were not blinded to the study groups, potentially influencing the objectivity of periodontal parameter assessments (15,17,190. Despite these limitations, the overall risk of bias was low in most studies, supporting the general reliability of their findings (Fig. 2).

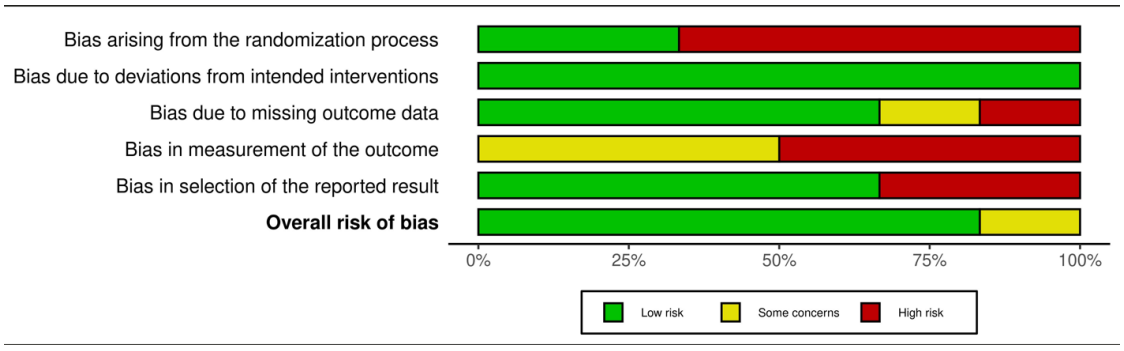

Fig. 2. The articles included in the study were assessed for the estimated risk of bias.

Table 1- Includes details such as Authors, Title of the Study, Study groups involved, Sample size and interventions providing a structured summary of the included research

S.no	Author	Title	Subject categorization	Sample Size (n) and Study group	Intervention
1	Maggie M	Detection and Quantification of Porphyromonas gingivalis from Saliva of Schizophrenia Patients by Culture and TaqMan Real-Time PCR: A Pilot Study	Schizophrenia	35 Study groups - 2	Control group with schizophrenia Test group with other psychotic disorders
2	A Eltas	An assessment of periodontal health in patients with schizophrenia and taking antipsychotic medication	Schizophrenia	53 Study group - 2	Test group using medications like risperidone, quetiapine, olanzapine
3	Shreya Shetty	Schizophrenia and periodontal disease: An Oro-neural connection? A cross-sectional epidemiological study	Schizophrenia	250 Study groups - 2	Control group with schizophrenia Test group with healthy patients
4	Abhinav Singh	Periodontal predicaments and associated risk factors among patients with schizophrenia	Schizophrenia	156 Study groups - 2	Control group with schizophrenia Test group with healthy patients
5	Vladan Djordjević	Assessment of periodontal health among the inpatients with schizophrenia	Schizophrenia	190 Study groups - 2	Control group with schizophrenia Test group with healthy patients
6	Bariah Fahad Albahli	Association between schizophrenia and periodontal disease in relation to cortisol levels: an ELISA-based descriptive analysis	Schizophrenia	40 Study groups - 2	Control group with schizophrenia Test group with healthy patients

Table 2. presents data on Authors, Periodontal parameters assessed, results and conclusion offering a comparative analysis of the study groups.

S.no	Periodontal parameters assessed	Results	Conclusion
1	P. gingivalis	Real-time PCR results aligned with anaerobic culture in 95.7% of cases. *P. gingivalis* was detected in 78% of patients and 17% of controls (p=0.000). Median salivary *P. gingivalis* copy numbers were significantly higher in patients (5.3×10^{7}; range 0–2.73×10^{19}) compared to controls (1.91×10^{5}; range 0–6.82×10^{7}) (p=0.009). 4o	Real-time PCR confirmed quantitative culture findings, revealing (a) a significantly higher prevalence and load of *P. gingivalis* in the saliva of schizophrenia patients compared to non-psychiatric controls, and (b) a positive correlation between *P. gingivalis* levels and the severity of schizophrenia symptoms.
2	BOP, PPD, CAL, PI	The mean values of the Plaque Index (PI) and Bleeding on Probing (BoP) were found to be significantly higher in Group A compared to Group B	The researcher concluded that there is a high risk of periodontal disease among patients with schizophrenia, and there is an even higher risk of periodontal disease induced by medication that increased SFR.
3	GI, PI, PPP	Patients with a longer duration of schizophrenia showed significantly higher gingival and plaque index scores ($P < 0.001$), as well as deeper probing pocket depths ($P < 0.001$), indicating poorer periodontal health.	Schizophrenia, the potential bidirectional link cannot be ignored, as both conditions involve elevated cytokine activity.
4	CPI Index, CAL	Periodontal pockets were observed in 69.8% and loss of attachment (LOA) in 57% of participants. Males had significantly more sextants with pockets (2.76 ± 0.39) and LOA (1.47 ± 0.43) compared to females (1.98 ± 0.45 and 0.87 ± 0.37, respectively; $p \leq 0.001$).	Schizophrenic patients exhibited poor periodontal health, marked by significant periodontal breakdown and elevated loss of connective tissue attachment.
5	CPTIN Index	Patients in the study group had significantly higher CPITN scores (2.24 ± 0.98) compared to the control group (1.21 ± 1.10). Supra- or subgingival calculus was more common in the study group (46.8%), while gingival bleeding predominated in the control group (45.8%). Periodontal pockets were found in 35.8% of the schizophrenic inpatients.	The findings highlight the need for ongoing research into the oral health of psychiatric patients to identify effective improvement strategies. Future studies should emphasize the importance of periodontal health in this population and raise awareness among psychiatric professionals about their patients' oral health needs.
6	GI, PI, CAL, PPD	Patients in Group A (schizophrenia) showed significantly higher periodontal parameter values—GI: 2.467 ± 0.528, PI: 2.402 ± 0.526, PD: 2.854 ± 0.865 mm, and CAL: 1.726 ± 3.096 mm—compared to healthy individuals in Group B—GI: 0.355 ± 0.561, PI: 0.475 ± 0.678, PD: 1.493 ± 0.744 mm, and CAL: 0.108 ± 0.254 mm—indicating poorer periodontal health in the schizophrenic group.	The findings of this study provide substantial evidence supporting the classification of schizophrenia as a risk factor for periodontitis, underscoring the need for heightened attention to the oral health management of schizophrenic patients in dental settings—comparable to the care provided for individuals with other comorbid conditions such as diabetes mellitus.

Discussion

The findings of this review consistently demonstrate that individuals diagnosed with schizophrenia exhibit significantly poorer periodontal health compared to healthy control groups. This disparity is reflected across a range of clinical parameters, including elevated PI, GI, PD, and CAL. Such observations lend dedicated support to the hypothesis that schizophrenia may serve as a contributing factor in the development and progression of periodontal disease. These results are congruent with prior research, which has similarly reported heightened levels of

periodontal breakdown in psychiatric populations—particularly among individuals who are institutionalized or undergoing long-term pharmacological treatment [20,21].

One of the primary contributing factors to this deterioration in oral health appears to be the chronic use of antipsychotic medications, especially second-generation antipsychotics such as risperidone and olanzapine. These agents are known to reduce SFR, resulting in pharmacologically induced xerostomia. A reduction in saliva impairs the natural cleansing mechanisms of the oral cavity, thereby promoting microbial colonization and plaque accumulation. This, in turn, leads to increased gingival inflammation and greater susceptibility to periodontal damage [22].

Beyond medication effects, several behavioural and systemic issues compound the problem. Individuals with schizophrenia often experience cognitive impairment, reduced motivation, and difficulties in performing routine self-care tasks, including oral hygiene. These challenges, coupled with socioeconomic barriers and limited access to dental care services, significantly exacerbate the decline in oral health status within this population [23].

Microbiological analyses across the reviewed studies further substantiate these findings. Patients with schizophrenia showed elevated levels of *P. gingivalis*—a key periodontal pathogen—both in terms of prevalence and bacterial load, when compared to healthy individuals. These results align with broader microbial studies that suggest a dysbiosis in the oral microbiome of psychiatric patients. Such microbial imbalances may be mediated by systemic inflammation, immune system dysfunction, and changes in host-pathogen interactions, which are commonly reported in schizophrenia [24,25].

Methodologically, the quality of the included studies was assessed using the Cochrane Risk of Bias 2.0 tool. This evaluation revealed substantial heterogeneity in the methodological rigor of the studies. While some studies demonstrated a minimal risk of bias, others were affected by various limitations, including inadequate randomization procedures, absence of blinding during outcome assessments, and incomplete or inconsistent reporting of dropout rates. A frequent methodological shortcoming was the reliance on manual periodontal probing without standardized calibration, raising concerns about the reliability and reproducibility of clinical measurements (Higgins et al., 2019). These issues highlight the urgent need for more robust, well-designed clinical trials to better understand the interplay between schizophrenia and periodontal disease.

Despite these limitations, the consistency of results across diverse study populations and their alignment with global literature strengthen the proposed association between schizophrenia and periodontal health deterioration. Emerging evidence also points to gender-based differences in periodontal disease severity, as well as a correlation between the duration of psychiatric illness and the extent of periodontal decline. These findings underscore the importance of developing tailored preventive and therapeutic strategies. Interdisciplinary care models that incorporate dental professionals into mental health treatment teams may offer a promising avenue for addressing the complex oral health needs of individuals with schizophrenia.

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