

Review Article

Risk of Periodontal diseases in patients with Parkinson's disease- A Systematic Review

¹Vidhyasree. M, ²Bharathwaj V.V, ³Sathiyapriya. S, ⁴Prabu. D, ⁵Rajmohan. M, ⁶Sindhu. R, ⁷Dinesh Dhamodhar

¹IVth Year (Bachelor of Dental Surgery), ^{2,3,6}Senior Lecturer, ⁴Professor and Head of Department, ^{5,7}Reader, SRM Dental College, Ramapuram, Chennai, Tamil Nadu, India

ABSTRACT:

Background: To assess and analyse the risk of periodontal diseases in patients with Parkinson's disease. **Methods:** A literature search to collect relevant data was performed using PubMed Central, ScienceDirect, Cochrane and Wiley Online Library using the MeSH terms periodontal diseases and Parkinson's disease. 514 articles were screened from various sources, and six were related to the research question. The review was reported based on the preferred reporting items for systematic reviews and meta-analyses guidelines. **Results:** 6 cross-sectional studies were included in our systematic review. All of the studies produced results proving that the risk of periodontal disease in patients suffering from Parkinson's disease was significantly higher compared with normal populations of the same age group. **Conclusion:** There is strong conclusive evidence that the risk of periodontal disease in patients suffering from Parkinson's disease is high when compared to healthy patients of similar age groups. Adequate care and treatment are to be provided for the patients to avoid further complications.

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Corresponding author: Prabu D, Professor and Head of Department, SRM Dental College, Ramapuram, Tamil Nadu, India

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INTRODUCTION

Parkinson's disease, a progressive neurodegenerative disorder, primarily affects the motor system. Parkinson's disease is prevalent in people 60 years or older. Each patient presents with a different and unique set of symptoms because of the complexity of the disease.^[1]

Considered to be multifactorial, the aetiology of Parkinson's Disease is unknown. Though it occurs due to the degeneration of dopaminergic neurons in the basal ganglia, usually in the globus pallidus and substantia nigra, the part of the brain that controls movement, the reason for the death of the cells that produce dopamine is not known.^[2]

One of the main characteristic features of Parkinson's disease is the impairment of fine hand movements.^[3] The other characteristic features include malnutrition, osteoporosis, dementia, and tremor.^[4]

Rigidity, dyskinesia, bradykinesia, and akinesia are also features of Parkinson's disease that interfere with the individual's fine hand movements. Since the maintenance of oral hygiene is highly dependent on

such automated hand movements, this interference in the fine hand movements causes difficulties in maintaining proper oral hygiene, thus indicating early signs of Parkinson's disease.

Apart from these factors, patients with Parkinson's Disease tend to crave sweets, increasing their consumption of sugary foods, which alters the oral microflora. Furthermore, the effects of antiparkinsonian drugs on the oral cavity are less known.^[2,3]

The oral manifestations of Parkinson's disease include alterations in the amount of saliva produced, which can cause either xerostomia or hyper-salivation and swallowing difficulties. While xerostomia can cause rapid tooth decay, demineralisation of tooth enamel, loss of salivary antimicrobial protection and root caries, hypersalivation, also known as Sialorrhea, can cause bad breath, increase in the number of oral bacteria, thereby affecting oral hygiene.^[1,2,3]

These complications in swallowing and other changes in the salivary flow rate can also alter the self-

cleaning mechanisms of the oral cavity in patients with Parkinson's disease.^[4]

Furthermore, patients with Parkinson's disease can also face difficulty retaining their dentures and are susceptible to cracks in teeth due to bruxism and other problems related to mastication. They also suffer from orofacial pain, burning mouth syndrome, and taste impairment.^[1]

These derangements in the oral health of individuals with Parkinson's disease can result in oral disorders like dental caries and periodontal infections, eventually leading to teeth loss.^[5]

The other general symptoms of Parkinson's disease include loss of balance, gait dysfunction, autonomic disturbances, and cognitive impairments.^[6]

This diversity of symptoms affects various body systems, and hence interprofessional care is mandatory for patients with Parkinson's disease, which can, in turn, improve the quality of life.^[1]

Oral health is closely related to an individual's quality of life. As a result of periodontal disease, tooth loss can occur, which can, in turn, affect the eating and speaking processes. It can also harm a person's self-esteem and social interactions.^[1]

Apart from these complications, periodontal diseases may also be associated with the risk of cardiovascular diseases, arthritis, and other systemic diseases.^[1]

The reports of dental examinations of patients with Parkinson's disease are surprisingly low, and there are no programs that specifically address the preventive issues for the same.^[3]

It is important that dentists treating patients with Parkinson's disease are aware of the patient's vulnerabilities to implement strategies that ensure effective treatment.^[7]

Proper tooth brushing and flossing methods should be taught to the caregivers of these patients with Parkinson's disease to maintain good oral hygiene.^[8]

OBJECTIVE

To assess the risk and frequency of periodontal diseases in patients with Parkinson's disease.

MATERIALS AND METHODS

INCLUSION CRITERIA

1. Original articles
2. Articles based on periodontal diseases in patients with Parkinson's Disease
3. Cross-sectional studies

EXCLUSION CRITERIA

1. Studies done on oral conditions other than periodontal diseases
2. Studies done on neurological disorders other than Parkinson's disease
3. Studies done on the relationship between different diseases and Parkinson's disease
4. Articles in other languages
5. Animal studies

SEARCH STRATEGY

Published literature on the risk of periodontal diseases in patients with Parkinson's disease in databases such as PubMed Central, ScienceDirect, Wiley Online Library, and Cochrane was reviewed from 2000-2020. Relevant data was collected by conducting a literature search using the MeSH terms 'periodontal diseases' and 'Parkinson's disease'.

SEARCH ENGINES

1. PubMed
2. Wiley Online Library
3. ScienceDirect
4. Cochrane

Figure 1

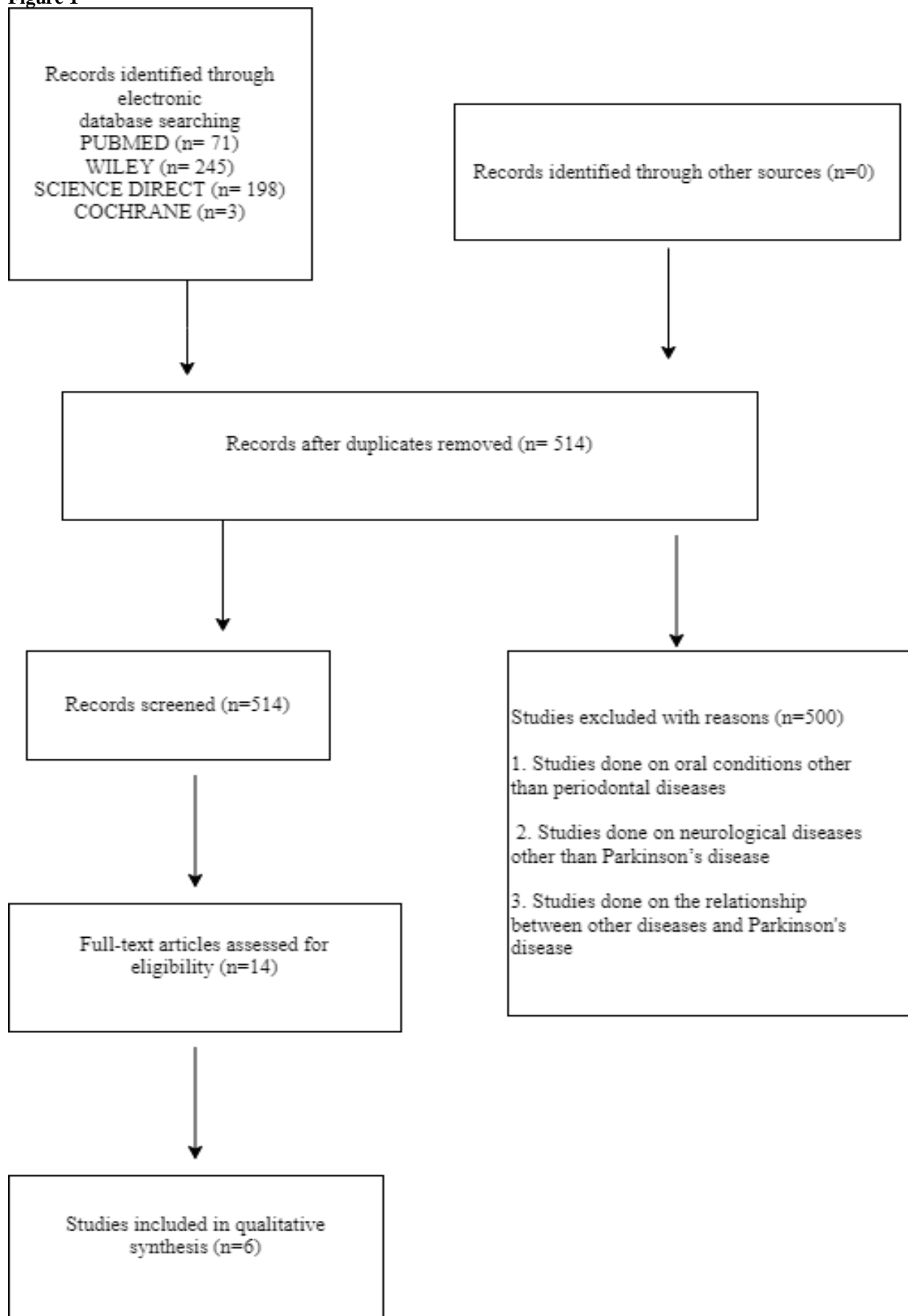


Table I: Characteristics of interventions in the study

Author Name	Year	Sample Size	Outcome	P Value
Johannes Schwarz et al ^[3]	2006	155	15 % of the population were rated as CPITN code 4, indicating an urgent need for therapy for periodontal pathology. In the control group, the respective values ranged between 17.9 % and 0 %	p < 0.01
Ayumi Hanaoka et al ^[5]	2008	157	The mean number \pm SD of remaining teeth in the control group was 17.6 ± 9.7 , and in the PD group was 14.0 ± 10.7 . The patients with PD had fewer remaining teeth. However, the teeth remaining were the same in each group.	p < 0.001
Thomas Müller et al ^[4]	2011	176	Compared to control subjects, males and females with PD were found to have more severe periodontal disease, more periodontal pockets, mobility, and gingival recession.	p < .001
Marco Ciccio` et al ^[9]	2012	90	Periodontal pockets were revealed in 250 of 330 teeth investigated in the PD study group with a positive bleeding score on pocket probing (92 of 250 teeth with periodontal disease). Severe tooth mobility on 74 of 250 teeth with periodontal disease was recorded. (ii)188 of 418 teeth in the control group revealed periodontal pockets with a negative bleeding score. No severe tooth mobility was recorded in the Control group.	Not specified
Avani R. Pradeep et al ^[10]	2013	91	The mean value of PD and CAL was higher in patients with PKD than in control subjects.	p < 0.05
Patrícia Lyra et al ^[6]	2020	28	The prevalence of periodontitis was high (75.0%), and the majority were severe cases (stage III) (46.4%). On average, the participants had 12 teeth missing and one tooth with pathological mobility. The average percentage of plaque and gum inflammation in the whole mouth was 37.0% (± 29.4) and 19.3% (± 21.1), respectively.	p < 0.05

Table II: Outcome data as reported in the included studies

Author Name	Year	Place	Study Design	Patient Age And Gender
Johannes Schwarz et al ^[3]	2006	Germany	Cross-sectional	Test patients: Mean age was 64.5 years (range 48–75) 31 females and 39 males Control subjects: Age 62 years (range 50–78) 44 females and 41 males.
Ayumi Hanaoka et al ^[5]	2008	Japan	Cross-sectional	60 to 79-year-old outpatients with Parkinson's Disease
Thomas Müller et al ^[4]	2011	Germany	Cross-sectional	mean age was 66.2 ± 10.5 years; there were 55 men (mean age 63.9 ± 10.7 years) and 46 women (mean age 69.1 ± 9.6 years)
Marco Cicciu` et al ^[9]	2012	Italy	Cross-sectional	65 - 78-year-old subjects with Parkinson's disease
Avani R. Pradeep et al ^[10]	2013	India	Cross-sectional	50 to 79-year-old subjects with Parkinson's disease
Patrícia Lyra et al ^[6]	2020	Portugal	Cross-sectional	Patients with Parkinson's disease around 70 years of age Female: 5 Male: 23

Table III: Characteristics of bias in different studies taken for review

Author Name	Selection				Comparability	Outcome/ Exposure	
	Sample Representation	Sample size	Non-respondents	Risk factor		Assessment of outcome	Statistical test
Johannes Schwarz et al ^[3]	+	+	+	+	+	+	?
Ayumi Hanaoka et al ^[5]	+	+	+	+	+	+	+
Thomas Müller et al ^[4]	+	+	+	+	+	+	+
Marco Cicciu` et al ^[9]	-	+	+	+	+	+	+
Avani R. Pradeep et al ^[10]	-	+	+	+	+	+	+
Patrícia Lyra et al ^[6]	-	+	+	+	+	+	+

Table III shows the bias analysis of all the included studies.

- High-risk bias: -
- Low-risk bias: +
- Unclear: ?

DISCUSSION

In this systematic review, six studies have been considered to assess periodontal disease risk in patients with Parkinson's disease. Both male and female patients affected by Parkinson's disease were evaluated. For periodontal analysis, various tests like Mann–Whitney test, t-test and Mantel-Haenszel test were employed, while for the grading of Parkinson's disease, the Hoehn and Yahr scale was used.

Johannes Schwarz et al. (2006) conducted a study on 70 patients with Parkinson's disease showing results that there was a difference between male and female patients and that there was a greater risk of developing periodontal disease in female patients with

Parkinson's disease. It also concluded that there is novel evidence that limited dental care and impaired motor skills are the primary risk factors for Parkinson's disease.^[3]

Ayumi Hanaoka et al. (2008) concluded from their study conducted on 68 patients that the frequency of periodontal disease was higher in patients with Parkinson's disease, with fewer numbers of remaining teeth in the oral cavity, and the prevalence of periodontal disease was high even in the early stage of Parkinson's disease. In this study, periodontal pathology developed from an early Hoehn and Yahr stage. Hence, it was concluded that motor and cognitive impairment might not account for all the

factors that lead to poor oral hygiene in patients with Parkinson's disease.^[5]

Thomas Müller et al. (2011) conducted a study on 101 patients with Parkinson's disease. They found that the subjects with Parkinson's disease generally had a poorer state of oral health, which contributed to the occurrence of many dental, oral and maxillofacial problems. Periodontal disease may increase during the progression of the disease in patients with Parkinson's. Other manifestations, like the diminishing salivary flow in this disease, tend to affect oral health by interfering with its protective functions, thereby increasing the risk of periodontal disease.^[4]

Marco Cicciu` et al. (2012) provided data results of the study conducted on a total of 90 patients that showed significantly high frequencies of periodontal disease in patients with Parkinson's disease compared with the control group, which showed no marked bleeding or gingival inflammation. To the results of the investigations, the oral health of patients with Parkinson's disease can generally be considered worse than that of the general population.^[9]

Avani R. Pradeep et al. (2013) conducted a cross-sectional study on 45 patients with Parkinson's disease and 46 control subjects. It was found that, in Parkinson's disease, the periodontal health of the patients starts to deteriorate during the early stages of the disease and worsens with the progression of the disease.^[10]

Patrícia Lyra et al. (2020) conducted a study on 28 participants, which showed that the prevalence of periodontitis and gum inflammation was higher in individuals who have Parkinson's disease compared with the control subjects. It was also noted that men have more prevalence of periodontitis than women.^[6]

CONCLUSION

There is strong conclusive evidence that the risk of periodontal disease in patients with Parkinson's is high compared to healthy patients of similar age groups. Motor and cognitive impairments, alterations in salivary flow, medications, and inadequate oral health care may be the factors that lead to poor oral hygiene in patients with Parkinson's disease, which can, in turn, proceed in a variety of oral diseases, periodontal disease being a common disease amongst them. Therefore, adequate care and treatment are to be provided for the patients to avoid further complications.

CONFLICT OF INTEREST

No conflict of Interest

SOURCE OF FUNDING

None

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