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# An epidemiological analysis of patients diagnosed with periodontitis at a tertiary institution

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M Ahmed,[1] F Kimmie-Dhansay[2], Anthea Jeftha[3]

## ABSTRACT

### Introduction

An analysis of the epidemiological factors associated with the diagnosis of periodontitis is important baseline evidence for the study of this disease within our population. This evidence will be valuable baseline information to inform intervention protocols that are contextual to our society. There is a scarcity of studies on periodontitis in South Africans.

### Aims and objectives

To describe the epidemiological and clinical characteristics of periodontitis patients diagnosed between 2014-2019 at a tertiary institution in SA. Design. A retrospective records-based study was conducted.

### Methods

Data from 450 patients diagnosed with periodontitis were extracted. Data sets including age, sex, smoking, presence of diabetes, and other systemic diseases were analysed. Periodontal parameters such as plaque score, plaque index, gingival bleeding score, gingival index, number of missing teeth, probing depths, and clinical attachment loss were included for analysis.

### Results

Males had higher bleeding index (p=0.035), deeper pockets (p=0.003), and more attachment loss (p<0.001), compared to females. Deeper periodontal pockets were observed in patients with systemic diseases (p=0.018). Smokers had a lower bleeding percentage (p=0.039). There was a higher plaque percentage (p=0.031), and bleeding index (p=0.043), deeper pockets (p<0.001) and more attachment loss (p<0.001) in patients with diabetes mellitus.

### Conclusion

Worse periodontal status was observed in males, and patients with diabetes or other general diseases. Additional research is required to elucidate the role of sex and systemic conditions as predisposing factors to periodontitis.

### Keywords

Epidemiology periodontitis, Adult periodontitis, Periodontal attachment loss, Prevalence periodontitis, Risk factors periodontitis, Smoking periodontitis, Diabetes periodontitis, Sex periodontitis, Systemic disease periodontitis, Hypertension periodontitis

**Author affiliations:**

1. Mai Ahmed: *BDS, MSc* in Periodontology, University of the Western Cape, South Africa. ORCID: 0000-0003-2913-8364
2. F. Kimmie - Dhansay: *BSc, BChD, PgDipl, PgDipl, MSc, MSc,* Community Oral Health, University of the Western Cape, South Africa ORCID: 0000-0003-2919-6193
3. Anthea Jeftha: *BChD, MChD,* Oral Medicine and Periodontology, University of the Western Cape, South Africa. ORCID: 0000-0003-0910-5899

**Corresponding author:**
Mai Ahmed
Rm D4 Tygeberg Hosp- U W C Dental School,Francie Van Zijl Drive, Parow, Cape Town,7500
Email: 3913853@myuwc.ac.za
Cell no: 0833664289

**Author contributions:**

1. Mai Ahmed: 45%
2. Dr F. Kimmie- Dhansay: 15%
3. Anthea Jeftha: 40%

## INTRODUCTION

Periodontal diseases are among the most ubiquitous conditions of humankind. It constitutes a public health challenge, affecting 20-50% of adults worldwide to some degree.[1] Periodontitis has local and general consequences in the body, as it can contribute to inflammation, and lower quality of life, with the potential to affect multiple conditions, such as cardiovascular disease,[2] diabetes,[3] cognitive impairment,[4] pregnancy outcomes,[5] cancer,[6] respiratory diseases,[7] metabolic syndrome,[8] rheumatoid arthritis,[9] and chronic kidney disease.[10,11]

Interindividual differences in the susceptibility to periodontitis highlight the importance of risk factors in the development, evolution, and severity of the disease. The most studied risk factors for periodontitis include sex, smoking, diabetes, alcohol intake, nutritional deficiencies, obesity, and stress.[12] An increased comprehension of predisposing factors is essential for clinicians to identify individuals at risk and create specific strategies to help prevent disease, decrease its severity, and ultimately restore health.[13]

Several studies have reported a strong link between dental plaque and gingival inflammation, regardless of sex, age, or racial/ethnic background.[14–16] Although the accumulation of dental plaque is typically the first

step in the development of gingival inflammation, the progression from gingivitis to periodontitis is host dependent. The relation between the host response and the microbiota is modulated by genetic and environmental factors, including older age, male sex, stress, genetics, ethnicity, smoking, socioeconomic status, presence of diabetes, and other systemic diseases.[17–22]

Periodontal infections can induce bacteraemia, elevate white blood cell counts, increase expression of local and systemic pro-inflammatory cytokines, with the potential to decrease endothelial structure, general metabolism, platelet behaviour, coagulation, oxidative stress, and general inflammation.[23] Therefore, despite the current lack of knowledge on the exact pathways through which periodontal disease can be detrimental to general health, research supports its role as a contributing risk factor for systemic diseases.

Thus, systemic diseases can contribute to changes that predispose to periodontal destruction, while periodontitis might also influence the course of systemic diseases. Despite the non-modifiable nature of some risk factors, lifestyle and systemic factors can be addressed in patient care. There is a scarcity of studies on risk factors and risk indicators on periodontitis in South Africans, therefore it is crucial to report the epidemiological determinants of patients diagnosed with periodontitis in South Africa. The present study aims to describe the epidemiological determinants and clinical characteristics of patients diagnosed with periodontitis from 2014 to 2019 at a tertiary institution in South Africa.

## MATERIAL AND METHODS

### Data collection and analysis

This study was a retrospective, descriptive, analytic study, all data were collected from the patients' files at the Faculty of Dentistry, University of the Western Cape, from 2014 to 2019, and recorded in a Microsoft Excel® sheet. The study was approved by the the Biomedical Research Ethics Committee of the University of the Western Cape (Ethics Reference Number: BM20/8/4).

The data included patient age, sex, smoking status (smoker - a participant who had smoked over five packs of cigarettes [100 cigarettes] in his/her life and currently smoked over 1 cigarette/day at the time of the study; non-smoker – all remaining patients according to Kim & Jung [2013]24, number of missing teeth, presence of diabetes and systemic disease.

The following clinical parameters were extracted from each patient's records:

- Probing depth (PD): values were recorded at six sites per tooth (mesiobuccal, mid buccal, distobuccal, mesiolingual, mid lingual, distolingual).
- • Plaque percentage score and Silness-Löe plaque index: values were recorded at six sites per tooth (mesiobuccal, mid buccal, distobuccal, mesiolingual, mid lingual, distolingual).
- Bleeding percentage score and Löe-Silness gingival index: values were recorded 30 seconds after periodontal probing at six sites per tooth (mesiobuccal, mid buccal, distobuccal, mesiolingual, mid lingual, distolingual).
- Clinical attachment level (CAL) was measured as the distance from the cementoenamel junction (CEJ) to the bottom of the periodontal pocket.

### Inclusion and exclusion criteria

Records of patients who had been diagnosed with periodontitis between 2014 and 2019 at the Faculty of Dentistry were included. The umbrella term "periodontitis" includes all forms of periodontitis. Patients diagnosed according to the periodontal classifications of 1999 and 2017 were included. Only the initial periodontal chart was captured for study participants. Charts from both undergraduate and post-graduate students were included.

Records prior to 2014 and after 2019 were excluded. Patients who were not diagnosed with periodontitis were excluded from the study. Folders that did not present all relevant information were excluded.

### Statistical analysis

Summary statistics for categorical data were presented as frequencies and percentages. Continuous data was presented as means and standard deviations. The outcome variables were plaque percentage score, plaque index, bleeding percentage score, gingival index, pocket depth, clinical attachment loss, and the number of missing teeth. Bivariate analysis was performed to evaluate the outcome variables according to sex, smoking status, diabetes, and systemic diseases using independent samples t-test, paired t-test, Welch t-test, ANOVA, or Kruskal Wallis test. All the statistical tests were conducted using StataCorp. 2017 (Stata Statistical Software: Release 15. College Station, TX: StataCorp LLC). Statistical results were considered significant at $p<0.05$.

## RESULTS

There were 603 patients diagnosed with periodontitis at the Faculty of Dentistry, the University of the Western Cape, between 2014 and 2019, however, 450 patients' data were complete and included in this analysis. In total, 246 were females (54.7%) and 204 were males (45.3%). The mean age and standard deviation were 48.9 ± 16.6 years. There

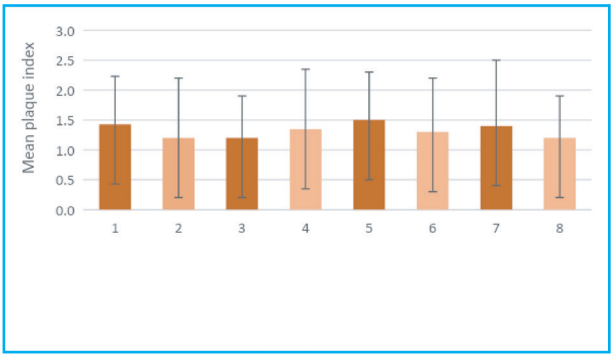



**Figure 1: Silness-Löe plaque index (vertical bars represent standard deviation) according to sex, smoking status, diabetic status and presence of systemic disease.**

was no statistically significant difference in mean age between males and females (49.5 ± 17.6 vs. 48.3 ± 15.7, respectively, p=0.324).

## Sex

There was no statistical significance difference in plaque index or plaque percentage scores between the sexes as is depicted below (Figures 1 and 2). The mean value for the Silness-Löe plaque index was 1.4 ± 0.8 for males and 1.3 ± 1.0 for females (p = 0.241, Figure 1). Mean plaque percentage value for males was 52.9 ± 25.1% and 50.8 ± 25.3% for females (p=0.442, Figure 2).

A higher mean gingival index was observed for males (1.3 ± 0.6 mm) as compared to females (1.1 ± 0.4 mm, p=0.035, Figure 3). When bleeding on probing was evaluated as mean percentage, there was no statistically significant difference between males (54.5 ± 28.1%) and females (50.6 ± 25.5%, p=0.187, Figure 4).

Males presented higher mean probing depth than females (3.2 ± 0.8 mm vs. 3.0 ± 0.7 mm, respectively, p=0.003, Figure 5) and higher mean attachment loss (3.6 ± 1.0 mm) when compared to females (3.2 ± 1.1 mm, p<0.001, Figure 6). The mean number of missing teeth was not influenced by gender (7.9 ± 5.2 for males vs. 8.3 ± 6.1 for females, p=0.493. Figure 7).

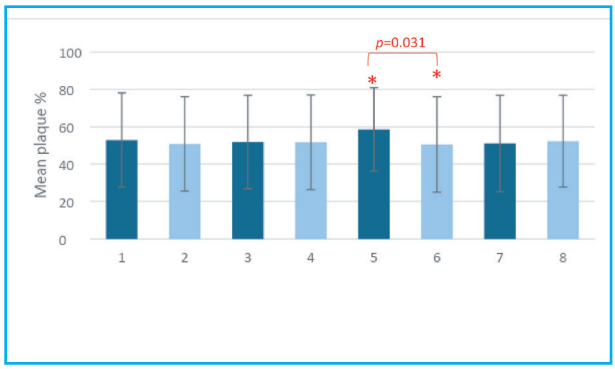



**Figure 2: Mean plaque percentage (vertical bars represent standard deviation) according to sex, smoking status, diabetic status and presence of systemic disease.**

***p=0.031 for comparison between diabetes and non-diabetes groups.**

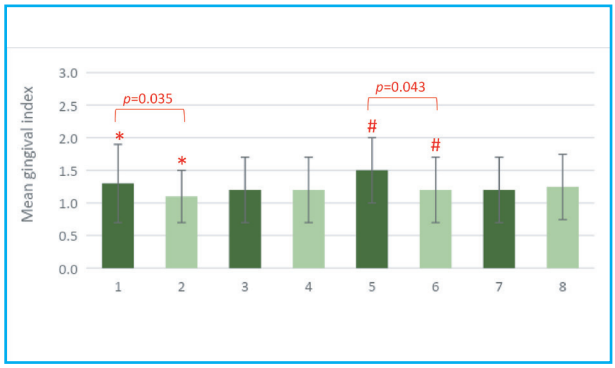
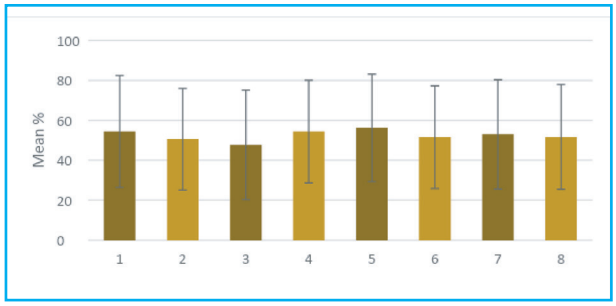



**Figure 3: Löe-Silness gingival index (vertical bars represent standard deviation) according to sex, smoking status, diabetic status and presence of systemic disease.**

***p=0.035 for comparison between males and females**
**#p=0.043 for comparison between diabetes and non-diabetes groups.**



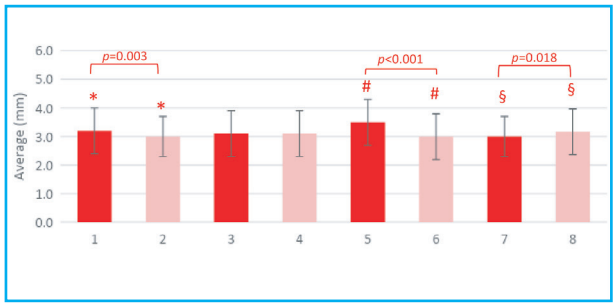




**Figure 5: Mean probing depth (mm) (vertical bars represent standard deviation) according to sex, smoking status, diabetic status and presence of systemic disease.**

***p=0.003 for comparison between males and females**
**#p=<0.001 for comparison between diabetes and non-diabetes**
**§p=0.018 for comparison between groups with and without systemic disease**

## Smoking status

In total, 138 participants (30.7%) were smokers, while 312 were non-smokers (69.3%). For the smokers, 57.2% were males (n=79), and 42.8 were females (n=59). The prevalence of smoking was higher among males (38.7%) as compared to females (24.0%, p<0.001).

The presence of plaque was not influenced by smoking status when the Silness-Löe plaque index (1.3 ± 0.7 for smokers vs. 1.4 ± 1.0 for non-smokers, p = 0.620, Figure 1), nor mean plaque percentage (51.9 ± 25.0% for smokers vs. 51.7 ± 25.3% for non-smokers, p=0.949, Figure 2) were analysed.

Smokers presented lower mean bleeding percentages than non-smokers (47.7 ± 27.4% vs. 54.4 ± 25.7%, respectively, p=0.039, Figure 3). However, when the Silness-Löe gingival index was applied, smokers and non-smokers presented comparable indexes (1.2 ± 0.5 for both groups, p=0.935, Figure 4).

Mean probing depth (3.1 ± 0.8 mm for both groups, p = 0.983, Figure 5), mean attachment loss (3.4 ± 0.9 mm) for smokers vs. (3.4 ± 1.1 mm for non-smokers, p=0.459, Figure 6) and number of missing teeth (8.3 ± 5.4 for smokers vs. 8.0 ± 5.8) for non-smokers, p=0.623, Figure 7) were not influenced by smoking status.

## Diabetes status

In total, 64 participants had diabetes (14.2%), of which 43 had diabetes combined with one or more systemic conditions (67.2%), and 21 had only diabetes (32.8%, Table 1).

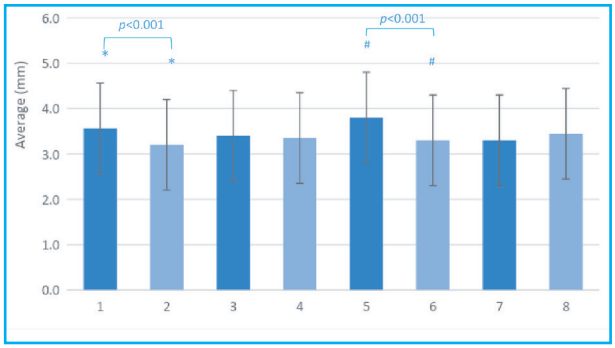



Figure 6: Mean attachment loss (mm) (vertical bars represent standard deviation) according to sex, smoking status, diabetic status and presence of systemic disease.

*p<0.001 for comparison between males and females
*p<0.001 for comparison diabetes and non-diabetes

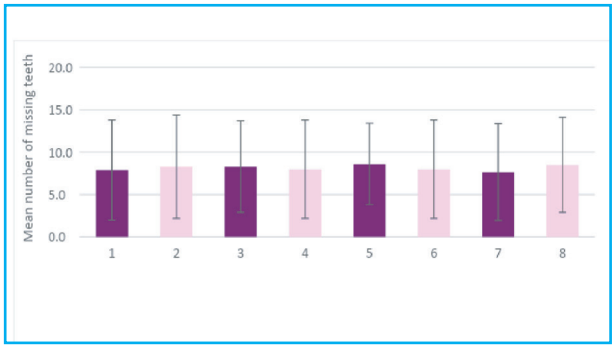



Figure 7: Mean number of missing teeth (vertical bars represent standard deviation) according to sex, smoking status, diabetic status and presence of systemic disease.

No difference was observed for the Silness-Löe plaque index, (1.3 ± 0.9 for non-diabetics vs. 1.5 ± 0.8 for diabetics, p=0.488, Figure 1). Mean plaque percentage was higher for patients with diabetes (58.6 ± 22.3%) when compared to non-diabetics (50.5 ± 25.5%, p=0.031, Figure 2).

Patients with diabetes presented marginally higher bleeding index according to the Löe & Silness gingival index (p=0.043, Figure 3). When gingival bleeding was analysed as mean percentage, it was not influenced by diabetes status, p=0.258 (Figure 4).

Higher mean probing depth was observed for the diabetes group (3.5 ± 0.8 mm) when compared to the non-diabetes group (3.0 ± 0.8 mm, p<0.001, Figure 5). Attachment loss was influenced by diabetes status, with non-diabetics presenting lower mean attachment loss (3.3 ± 0.9 mm) when compared to diabetics (3.8 ± 1.5, p<0.001, Figure 6). The number of missing teeth was not statistically different between diabetics (8.6 ± 4.8) and non-diabetics (8.0 ± 5.8, p=0.423, Figure 7).

## Other systemic conditions

In the studied sample, 51.6% of the participants had other systemic diseases (n=232), from which 145 (62.5%) had one condition, 65 had two conditions (28%), and 21 had three or more conditions (9.5%, Table 2). Hypertension (n=42, 28.9%), diabetes (n=21, 14.5%), and HIV (n=14, 9.7%) were the most prevalent single conditions. In patients with two conditions, hypertension and altered cholesterol (n=15, 23.1%), diabetes and hypertension (n=15, 23.1%), and diabetes and altered cholesterol (n=4, 6.2%) were the most prevalent combinations. In patients with three or more conditions, diabetes, hypertension, and altered cholesterol was the most common combination (n=3, 13.6%).

There was no difference in plaque index (1.4 ± 1.1) for no disease vs. systemic disease groups (1.2 ± 0.7, p=0.338, Figure 1), nor in plaque percentage (51.1 ± 25.5% for no disease vs. 52.3 ± 24.6% for presence of systemic disease, p=0.654, Figure 2).

Gingival bleeding was not influenced by the presence of systemic disease, measured as gingival index (1.2 ± 0.5 for both groups, p=0.502, Figure 3) or bleeding percentage (53.0 ± 25.5% for no disease vs. 51.7 ± 26.2% for systemic disease, p=0.668, Figure 4).

Having a systemic disease was linked to higher mean probing depth (3.2 ± 0.8 mm) when compared to absence of systemic disease (3.0 ± 0.7 mm, p=0.018, Figure 5). Mean attachment loss was not influenced by systemic diseases (3.3 ± 1.0 mm for systemic diseases vs. 3.5 ± 1.1 mm for the group with no systemic disease,

**Table 1. Prevalence of diabetes alone and combined with other conditions.**

| Diabetes status | N |
|---|---|
| Diabetes only | 21 |
| Diabetes + other conditions | 43 |
| DM2 - Anaemia | 1 |
| DM2 - Arthritis - Cholesterol - Hyperthyroidism | 1 |
| DM2 - Cholesterol | 4 |
| DM2 - Depression | 1 |
| DM2 - Heart condition | 3 |
| DM2 - HTN | 15 |
| DM2 - HTN - Arthritis - Cholesterol | 1 |
| DM2 - HTN - Arthritis - Gout | 2 |
| DM2 - HTN - Asthma | 2 |
| DM2 - HTN - Cholesterol | 3 |
| DM2 - HTN - Cholesterol - Osteoarthritis | 1 |
| DM2 - HTN - Epilepsy | 1 |
| DM2 - HTN - Heart condition - Cholesterol | 1 |
| DM2 - HTN - Kidney Failure | 1 |
| DM2 - HTN- Ehlers danlos syndrome | 1 |
| DM2 - HTN Heart condition | 2 |
| DM2 - Hyperthyroidism | 1 |
| DM2 - Prostate Cancer | 1 |
| DM2 - Thalassemia | 1 |
| **Total** | **64** |

**Table 2. Prevalence and description of one, two, and three or more systemic conditions.**

| One systemic condition | N | Two systemic conditions | N | Three or more systemic conditions | N |
|---|---|---|---|---|---|
| Hypertension | 42 | Hypertension - Cholesterol | 15 | Diabetes - Hypertension - Cholesterol | 3 |
| Diabetes | 21 | Diabetes - Hypertension | 15 | Diabetes - Hypertension - Arthritis - Gout | 2 |
| HIV | 14 | Diabetes - Cholesterol | 4 | Diabetes - Hypertension - Asthma | 2 |
| Arthritis - all types | 8 | Hypertension - Arthritis | 3 | Diabetes - Hypertension - Heart condition | 2 |
| Kidney problems | 8 | Diabetes - Heart condition | 3 | Asthma - Cholesterol - Active thyroid | 1 |
| Asthma | 7 | Hypertension - HIV | 2 | Hypertension - Gout - Heart Failure - Cholesterol | 1 |
| Mental problems | 6 | Hypertension - Anemia | 2 | Heart condition - Cholesterol - Prostate cancer | 1 |
| Cholesterol | 6 | Hypertension - Heart condition | 2 | Mental impairment - Eye problem - Kidney failure - Heart valve replacement | 1 |
| Heart condition | 6 | Hypertension - Thyroid disorder | 2 | Rheumatoid Arthritis - Prostate cancer - Heart bypass - Hyperthyroidism | 1 |
| Anemia | 5 | Heart condition - Asthma | 1 | Hypertension - Arthritis - Cholesterol - Osteoporosis - Hyperthyroidism - Collagenous colitis | 1 |
| Epilepsy | 3 | Hypertension - Gout | 1 | Diabetes - Hypertension - Arthritis - Cholesterol | 1 |
| Schizophrenia | 3 | Hypertension - Myasthenia gravis | 1 | Diabetes - Hypertension - Cholesterol - Osteoarthritis | 1 |
| Cancer | 3 | Hypertension - Arthritis | 1 | Diabetes - Hypertension - Epilepsy | 1 |
| Sinusitis | 2 | Hypertension- Asthma | 1 | Diabetes - Hypertension - Heart condition - Cholesterol | 1 |
| Thyroid disorder | 3 | Hypertension - kidney transplant | 1 | Diabetes - Hypertension - Kidney failure | 1 |
| Retinal necrosis | 1 | Hypertension - Asthma | 1 | Diabetes - Hypertension - Ehlers danlos syndrome | 1 |
| Cleidocranial dysplasia | 1 | Hypertension - Lupus erythematosus | 1 | Diabetes - Arthritis - Cholesterol - Hyperthyroidism | 1 |
| Eczema | 1 | Arthritis - Renal problem | 1 | **Total** | **22** |
| Myasthenia gravis | 1 | Cerebral palsy - Anemia | 1 | | |
| Osteogenesis imperfecta | 1 | Kidney transplant - Bipolar disorder | 1 | | |
| Papillon-Lefèvre syndrome | 1 | Osteoarthritis - Neuroendocrine cancer | 1 | | |
| Rheumatic fever | 1 | Diabetes - Anemia | 1 | | |
| Irritable bowel syndrome | 1 | Diabetes - Depression | 1 | | |
| **Total** | **145** | Diabetes - Hyperthyroidism | 1 | | |
| | | Diabetes - Prostate Cancer | 1 | | |
| | | Diabetes - Thalassemia | 1 | | |
| | | **Total** | **65** | | |

p=0.146, Figure 6). The mean number of missing teeth was not statistically different for participants with systemic diseases (8.5 ± 5.6) as compared to those without (7.7 ± 5.7, p=0.098, Figure 7).

## DISCUSSION

In the current study, sex, presence of diabetes, and other systemic diseases were associated with more clinical attachment loss. Males had a higher bleeding index, deeper pockets, and more attachment loss, compared to females. Deeper periodontal pockets were observed in patients with systemic diseases. In smokers, a lower bleeding percentage was observed. There was a higher plaque percentage, higher bleeding index, deeper pockets, and more attachment loss in diabetics. Results from this study provide valuable information given the general scarcity of data on the periodontal status of South African adults diagnosed with periodontitis.

Few South African studies report on the prevalence of periodontal disease.[25–27] In 1994, the Department of Health published the first National Oral Health Survey of South Africa, which included over 5200 participants from different racial backgrounds from all over the country. The prevalence of periodontitis in adults [35-44] years of age was 29.7%.[26] In the study from Chikte et al. (2019), a sample of 951 participants from mixed ethnic heritage living in the Bellville area in the Western Cape were evaluated for markers of periodontal disease. In total 68.3% of the sample had bleeding on probing, 56.7% had pocket depth 4 mm and above, and 40.2% had AL ≥ 4 mm.[25]

In a South African study on periodontitis characteristics in HIV patients, the control group (HIV negative, no systemic disease) presented average pocket depth of 3.2 mm, mean bleeding percentage of 50.3%, and mean plaque percentage of 75.2%. Average bleeding percentage and pocket depth are similar to the current results, however, plaque percentage was lower in the

present study.[28] In the current study, 6.9% of the group who presented with systemic conditions had HIV. Because patients are not compelled to disclose their HIV status, the prevalence of HIV in the current study is likely under-reported.

Similar to the findings from this study, Chikte et al. reported worse periodontal status in South African males, with a higher prevalence of periodontal pockets and attachment loss. However, only males with mixed heritage residing in the Bellville area were included.[25] In a systematic review including over 50.000 subjects from Shiau and Reynolds. (2010), there was an association between periodontitis and sex, with males having a 9% greater prevalence than females.[29] The higher risk for periodontitis in males has been reported irrespective of age, ethnicity, and geographic location. and attributed to biological dimorphism that manifest as differences in the immune system and dental plaque, as well as behavioural factors that influence daily oral hygiene habits and attendance of regular dental visits.[30]

In this study, two different methods were used to describe the presence of dental plaque and gingival bleeding, which are key markers for oral hygiene and gingival inflammation.[31] The Silness-Löe plaque index is a scoring system based on the thickness of plaque accumulation,[32] while plaque percentage score registers presence or absence of dental plaque. While non-diabetics had a lower plaque percentage than diabetics, no difference of statistical significance was detected for the Silness-Löe plaque index. Similarly, for gingival bleeding, the Löe-Silness gingival index based on a 0 to 3 score system,[32] and the bleeding percentage (presence or absence of gingival bleeding) were evaluated. When comparing smokers to non-smokers, the gingival index score was not statistically different, however, smokers presented with a lower bleeding percentage. Comparison between different indices is impractical, however, these results corroborate previous studies suggesting that scoring indices for plaque and gingival bleeding can be criticized given their high level of grading subjectivity and time-consuming nature.[33,34]

A strong body of evidence supports the association between diabetes and periodontitis.[35–37] Data from this study further support diabetes as a risk factor for periodontal disease, given the higher severity of clinical markers in the diabetes group. The worse periodontal status in the diabetes group could be partially explained by the higher plaque percentage.

Nevertheless, there was no statistical difference between diabetes and non-diabetes groups when dental plaque was evaluated through the Silness-Löe index. Rabede et al. (2009) explored the oral health of diabetes patients in South Africa. The study reported higher plaque index, increased prevalence of periodontitis, and worse oral health in the diabetes group compared to systemically healthy periodontitis patients.[38]
In a South African study from Matu et al. (2009), diabetes patients presented higher prevalence and severity of periodontitis as compared to non-diabetic patients, with no differences in plaque index.[39] The greater gravity of periodontitis in patients with diabetes have been attributed to the biological changes resulting from chronic hyperglycaemia and its complications, such as angiopathy, oxidative stress, inflammation, impaired wound healing amongst other conditions.[40]
There is also evidence on the connection between periodontal disease with other systemic conditions.[41]

In the present study, hypertension, diabetes, HIV, arthritis and kidney problems were the most prevalent single conditions in periodontitis patients. Despite the lack of data proving causality between periodontitis and these conditions, most studies suggest the potential for a two-way relationship, where systemic changes increase the risk for periodontal destruction and periodontitis increases the risk for metabolic and inflammatory changes.[42] The high prevalence of systemic disease in the studied sample highlights the importance of the correlation between oral and systemic health, indicating that the potential beneficial effects of periodontal treatment are not only confined to the oral cavity.[43]

Although the literature indicates that smoking increases the risk for periodontitis, the only statistically significant difference observed between non-smokers and smokers in the present study was lower gingival bleeding for the latter, mediated by the vasoconstriction caused by nicotine and other tobacco components.[44] It can be speculated that the lack of association between smoking and periodontitis in this study might be linked to the lack of information on smoking frequency, given that periodontitis risk in smokers is dose-dependent.[45] Other explanations include the potential exposure of non-smokers to passive smoking and the lack of distinction between former smokers and non-smokers.[25]

In the current study, the number of missing teeth was not affected by sex, smoking, diabetes, or other systemic diseases. This can be attributed to the high overall prevalence of tooth loss in the South African population due to the burden of caries and periodontitis, lack of access to preventive and restorative dental care, and cultural acceptance of tooth extraction as the definitive answer to dental problems.[46]

Detailed records on tobacco exposure would have been ideal. In addition, for future studies, diabetes should be characterized in terms of metabolic markers such as glycated haemoglobin given its impact on the development of complications.

## CONCLUSIONS

Several local, systemic, and environmental factors can impact periodontal disease severity, progression, and response to treatment. In patients from a tertiary institution in the Western Cape, South Africa, worse periodontal conditions were observed in male patients and those with diabetes and other systemic diseases. In patients with diabetes, this could be at least partly explained by inadequate plaque control. Smoking was associated with lower gingival bleeding. Tooth loss was

not linked to sex, smoking, nor systemic diseases. Additional research is required to clarify the role of sex and systemic conditions as predisposing factors to periodontitis. Given the significance of periodontal disease for oral and general conditions and its multifactorial nature, it is crucial to explore risk factors that impact the etiopathogenesis of periodontitis.

### Conflict of Interest

The authors declare that they have no conflict of interest nor any financial interest in this study. Furthermore, we declare that the study does not have any commercial value and is done purely to add to the current pool of knowledge.

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