

Prevalence of Denture Stomatitis and Its Associated Risk Factors Among Complete Denture Wearers

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ABSTRACT

Background: Denture stomatitis is a common inflammatory condition affecting the denture-bearing oral mucosa in complete denture wearers. Its development is influenced by several local and behavioral factors, including prolonged denture use, continuous night-time wearing, inadequate denture hygiene, and accumulation of denture deposits. The present study was conducted to assess the prevalence of denture stomatitis and its associated risk factors among complete denture wearers.

Materials and Methods: A cross-sectional observational study was conducted among 100 completely edentulous patients wearing complete dentures for at least 6 months. Participants aged 40 years and above were evaluated using a structured questionnaire to record demographic characteristics, duration of denture use, night-time denture wearing, denture-cleaning practices, and smoking habits. Clinical examination of the denture-bearing mucosa was performed, and denture stomatitis was classified according to Newton's classification. The presence of visible denture deposits was also recorded. Data were analyzed using descriptive statistics and chi-square tests, with statistical significance set at $p < 0.05$.

Results: Denture stomatitis was identified in 38% of the participants. The prevalence was higher among participants aged ≥ 60 years (49.1%) compared with those aged < 60 years (23.3%). Participants using dentures for ≥ 5 years showed a significantly higher prevalence than those using dentures for < 5 years (46.9% vs. 22.2%, $p = 0.006$). Night-time denture wearing was significantly associated with denture stomatitis (50.9% vs. 20.9%, $p = 0.003$). Similarly, inadequate denture cleaning (51.9% vs. 22.9%, $p = 0.004$) and the presence of visible denture deposits (56.8% vs. 23.2%, $p < 0.001$) were significantly associated with denture stomatitis. Smoking showed a higher prevalence among smokers, but the association was not statistically significant ($p = 0.157$). Newton Type II was the most frequently observed clinical type (57.9%).

Conclusion: Denture stomatitis was relatively common among complete denture wearers in the present study. Prolonged denture use, night-time denture wearing, inadequate denture cleaning, and visible denture deposits were significantly associated with its occurrence. Appropriate denture hygiene, removal of dentures during sleep, regular maintenance, patient education, and periodic prosthodontic evaluation may help in reducing the occurrence of denture stomatitis.

Keywords: Denture Stomatitis; Complete Dentures; Denture Hygiene; Candida; Risk Factors; Newton Classification; Oral Mucosa.

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1. INTRODUCTION

Complete dentures are an important prosthodontic treatment modality for the rehabilitation of completely edentulous patients. They help restore mastication, speech, aesthetics, and overall oral function. However, wearing complete dentures may be associated with several alterations of the oral mucosa. Among these, denture stomatitis is one of the commonly encountered inflammatory conditions affecting the denture-bearing mucosa, particularly beneath the fitting surface of

maxillary complete dentures.¹ Denture stomatitis is a multifactorial condition in which both local and patient-related factors may contribute to its development. The presence of a denture can provide a favorable environment for microbial adhesion and biofilm formation. In particular, colonization by *Candida* species, especially *Candida albicans*, has been frequently associated with the development of denture stomatitis. Other predisposing factors include inadequate denture hygiene, prolonged or continuous denture wearing, characteristics of the denture, and factors related to the oral environment and host.¹

The association between denture stomatitis and *Candida albicans* has been extensively investigated. A systematic review and meta-analysis focusing on the Indian population reported the occurrence of denture stomatitis in association with *Candida albicans* and highlighted the importance of denture-related and patient-related factors in this condition.² The ability of *Candida* to adhere to denture surfaces and form biofilms may facilitate persistent colonization and contribute to inflammation of the underlying mucosa.^{1,2}

The severity of denture stomatitis may also be influenced by several risk factors. A cross-sectional study among completely edentulous individuals evaluated factors associated with the severity of denture stomatitis and their relationship with oral health-related quality of life.³ Assessment of these factors is clinically important because identification of modifiable risk factors may assist in prevention, early diagnosis, and appropriate management of denture-related mucosal conditions.

In addition to clinical factors, the microbiological characteristics of *Candida*-associated denture stomatitis have been investigated in denture-wearing populations. Clinical, epidemiological, and microbiological findings indicate that *Candida* colonization is an important component of the condition, although denture stomatitis is not attributable to a single factor alone.⁴ Therefore, evaluation of both denture-related and patient-related risk factors is important when determining the prevalence and possible determinants of denture stomatitis. Recent evidence has also focused on different approaches for the management of *Candida*-associated denture stomatitis. Photodynamic therapy, for example, has been investigated for its potential to reduce *Candida* colonization and improve clinical symptoms in patients with denture stomatitis.⁵ However, prevention remains an important aspect of prosthodontic care, particularly through appropriate denture hygiene, adequate denture maintenance, and identification of predisposing factors.

Although denture stomatitis has been widely investigated, its prevalence and associated risk factors may vary among different populations because of differences in denture-wearing habits, duration of denture use, denture hygiene practices, and other patient-related factors. Therefore, assessment of the prevalence of denture stomatitis and identification of its associated risk factors among complete denture wearers is clinically relevant. The findings may help prosthodontists recognize patients at increased risk and develop appropriate preventive and maintenance strategies.

2. METHODOLOGY

A cross-sectional observational study was conducted among 100 completely edentulous patients wearing complete dentures who reported to the Department of Prosthodontics. The study participants were selected using a convenient sampling technique. Patients aged 40 years and above who had been wearing complete dentures for at least 6 months were included in the study. Patients who were completely edentulous and were using either maxillary or maxillary and mandibular complete dentures were considered eligible. Patients with a history of radiotherapy or chemotherapy involving the head and neck region, those receiving systemic antifungal therapy, patients with severe systemic conditions affecting oral mucosa, and individuals who were unwilling to participate were excluded. Prior to participation, the purpose and procedures of the study were explained to all participants, and written informed consent was obtained. Relevant demographic and denture-related information was recorded using a structured questionnaire. The recorded variables included age, sex, duration of denture use, frequency of denture wearing, nighttime denture-wearing habits, denture cleaning practices, frequency of denture cleaning, method of denture cleaning, and history of smoking or other relevant habits.

A clinical examination of the oral cavity was performed under adequate illumination after removal of the dentures. The denture-bearing mucosa, particularly the palatal mucosa, was examined for the presence of erythema, inflammation, edema, or other mucosal alterations suggestive of denture stomatitis. Denture stomatitis was clinically assessed according to the Newton classification. Type I was recorded when localized simple inflammation or pinpoint hyperemia was present, Type II when diffuse erythema involving a part or the entire denture-bearing mucosa was observed, and Type III when inflammatory papillary hyperplasia was present.

The dentures were also examined for cleanliness, visible deposits, surface irregularities, and general condition. Denture hygiene was assessed clinically based on the presence or absence of visible plaque and debris on the fitting and polished surfaces. The duration of denture use and the habit of wearing dentures during sleep were recorded because these factors were considered potentially associated with the occurrence of denture stomatitis. The collected data were entered into a Microsoft Excel spreadsheet and subsequently analysed using statistical software. Descriptive statistics were used to

determine the prevalence of denture stomatitis and to summarize the demographic and denture-related characteristics of the study population. Categorical variables were expressed as frequencies and percentages. The association between denture stomatitis and potential risk factors, including age, sex, duration of denture use, nighttime denture wearing, and denture hygiene practices, was assessed using the chi-square test. A p-value of <0.05 was considered statistically significant.

3. RESULTS

A total of 100 completely edentulous patients wearing complete dentures were included in the analysis. The study population consisted of 56 male and 44 female participants, with a mean age of 61.3 ± 8.7 years. Clinically diagnosed denture stomatitis was observed in 38 patients, giving an overall prevalence of 38%. The remaining 62 patients did not show clinical features of denture stomatitis.

Table 1. Demographic characteristics of the study participants

Variable	Category	n (%)
Age	40–49 years	14 (14%)
	50–59 years	29 (29%)
	60–69 years	36 (36%)
	≥70 years	21 (21%)
Sex	Male	56 (56%)
	Female	44 (44%)
Total		100 (100%)

The highest proportion of participants belonged to the 60–69-year age group (36%), followed by those aged 50–59 years (29%). Denture stomatitis was more frequently observed among participants aged 60 years and above.

Table 2. Prevalence of denture stomatitis according to demographic characteristics

Variable	Category	Denture stomatitis n (%)	No denture stomatitis n (%)	Total
Age	<60 years	10 (23.3%)	33 (76.7%)	43
	≥60 years	28 (49.1%)	29 (50.9%)	57
Sex	Male	20 (35.7%)	36 (64.3%)	56
	Female	18 (40.9%)	26 (59.1%)	44
Total		38 (38%)	62 (62%)	100

The prevalence of denture stomatitis was higher among participants aged ≥60 years (49.1%) compared with those aged <60 years (23.3%). The prevalence was slightly higher among females (40.9%) than males (35.7%).

Table 3. Association between denture-related factors and denture stomatitis

Risk factor	Category	Denture stomatitis n (%)	No denture stomatitis n (%)	p-value
Duration of denture use	<5 years	8 (22.2%)	28 (77.8%)	0.006
	≥5 years	30 (46.9%)	34 (53.1%)	
Night-time denture wearing	Yes	29 (50.9%)	28 (49.1%)	0.003
	No	9 (20.9%)	34 (79.1%)	
Denture cleaning	Once daily or less	27 (51.9%)	25 (48.1%)	0.004
	Twice daily or more	11 (22.9%)	37 (77.1%)	
Visible denture deposits	Present	25 (56.8%)	19 (43.2%)	<0.001
	Absent	13 (23.2%)	43 (76.8%)	
Smoking	Yes	14 (48.3%)	15 (51.7%)	0.157
	No	24 (33.8%)	47 (66.2%)	

Denture stomatitis was more frequently observed among participants who had been wearing their dentures for ≥5 years, those who wore their dentures during nighttime, and those who reported less frequent denture cleaning. The presence of visible deposits on the denture surface was also significantly associated with denture stomatitis ($p < 0.001$). Smoking showed a higher prevalence of denture stomatitis among smokers, although the association was not statistically significant in this

analysis ($p=0.157$).

Table 4. Clinical severity of denture stomatitis according to Newton classification

Newton classification	Clinical presentation	n (%)
Type I	Localized/simple inflammation	9 (23.7%)
Type II	Diffuse erythema involving the denture-bearing mucosa	22 (57.9%)
Type III	Inflammatory papillary hyperplasia	7 (18.4%)
Total		38 (100%)

Among the 38 participants diagnosed with denture stomatitis, Newton Type II was the most frequently observed clinical presentation (57.9%), followed by Type I (23.7%) and Type III (18.4%).

Overall, the findings demonstrated a prevalence of denture stomatitis of 38% among the study participants. Higher occurrence was observed in patients with longer denture-wearing duration, nighttime denture use, inadequate denture-cleaning practices, and visible denture deposits. These findings suggested that modifiable denture-related factors may play an important role in the occurrence of denture stomatitis among complete denture wearers.

4. DISCUSSION

The present study evaluated the prevalence of denture stomatitis and its associated risk factors among complete denture wearers. The observed prevalence of denture stomatitis was 38%, indicating that a considerable proportion of complete denture wearers may develop inflammatory changes in the denture-bearing mucosa. Denture stomatitis is considered a multifactorial condition in which local prosthetic, microbial, and behavioral factors may contribute to the development and persistence of mucosal inflammation [6].

A higher prevalence of denture stomatitis was observed among participants aged ≥ 60 years compared with those below 60 years. This finding may be related to age-associated changes in oral mucosa, salivary function, immune response, and manual dexterity, which may influence denture hygiene and mucosal health. Previous studies have reported that oral mucosal lesions, including denture-related inflammatory conditions, are relatively common among older complete denture wearers [7].

In the present study, participants who had been using their dentures for ≥ 5 years showed a significantly higher prevalence of denture stomatitis than those using dentures for less than 5 years. Prolonged denture use may be associated with progressive changes in denture fit, surface characteristics, hygiene, and accumulation of microbial biofilm. Previous research has identified denture-related and patient-related factors as important contributors to the development of denture stomatitis [8]. Night-time denture wearing was also significantly associated with denture stomatitis. Participants who reported wearing their dentures during sleep demonstrated a higher prevalence of the condition than those who removed their dentures at night. Continuous denture wearing may reduce the opportunity for mucosal recovery and may create a favorable environment for microbial growth, particularly when combined with inadequate denture hygiene. Avoiding continuous denture wear and maintaining appropriate denture hygiene are therefore important preventive considerations [9].

Poor denture hygiene was another significant factor associated with denture stomatitis in the present study. Participants who cleaned their dentures once daily or less frequently had a higher prevalence than those who cleaned them twice daily or more. Similarly, visible deposits on dentures were strongly associated with the presence of denture stomatitis. These findings support the importance of regular mechanical cleaning and maintenance of dentures in reducing the accumulation of plaque and microorganisms [10]. The association between denture stomatitis and denture hygiene can be explained partly by the role of microbial biofilm. *Candida* species, particularly *Candida albicans*, have been frequently associated with denture stomatitis. Microbial colonization of the denture surface and subsequent interaction between microorganisms and the denture-bearing mucosa may contribute to the inflammatory process [11].

In the present study, Newton Type II denture stomatitis was the most frequently observed clinical presentation, followed by Type I and Type III lesions. Type II lesions are characterized by more generalized erythema of the denture-bearing mucosa and may represent a common clinical manifestation among denture wearers. Previous studies have reported variation in the distribution of different clinical forms of denture stomatitis depending on the characteristics of the study population and associated risk factors [12].

Smoking was associated with a higher prevalence of denture stomatitis in the present study; however, the difference was not statistically significant. Although smoking may influence the oral environment and mucosal response, the lack of

statistical significance in the present sample suggests that its independent contribution could not be established. Similar studies have emphasized that denture stomatitis is multifactorial and that several local and systemic factors may interact in its development [13].

The findings of the present study also emphasize the importance of preventive prosthodontic care. Patient education regarding proper denture cleaning, regular removal of dentures during sleep, appropriate denture maintenance, and periodic clinical evaluation may help reduce the risk of denture-related mucosal inflammation. Early identification of predisposing factors is particularly relevant in older complete denture wearers, who may require repeated reinforcement of oral and denture hygiene practices [14]. Management of denture stomatitis may involve improvement of denture hygiene, correction of contributing prosthetic factors, and appropriate therapeutic interventions when clinically indicated. Recent evidence has evaluated different approaches for the management of denture stomatitis, including antimicrobial and denture-related interventions [6]. Modified tissue conditioners have also been investigated as a potential treatment approach, although the available evidence suggests that treatment should be selected according to the clinical presentation and underlying predisposing factors [15]. Overall, the findings indicate that denture stomatitis is associated with several modifiable factors, particularly prolonged denture use, continuous night-time wear, inadequate denture cleaning, and visible denture deposits. These findings highlight the importance of combining appropriate prosthodontic management with patient education and regular follow-up to maintain healthy denture-bearing tissues.

The present study had certain limitations. Its cross-sectional design did not allow a temporal or causal relationship to be established between the identified risk factors and denture stomatitis. The sample size and sampling method may also limit the generalizability of the findings. In addition, denture stomatitis was assessed clinically, without microbiological confirmation of *Candida* colonization. Future studies with larger samples, longitudinal designs, and microbiological assessment may provide further information regarding the relationship between denture hygiene, *Candida* colonization, and denture stomatitis.

5. CONCLUSION

The present study demonstrated that denture stomatitis was a relatively common condition among complete denture wearers, with a prevalence of 38%. Higher occurrence was observed among older participants and those with longer duration of denture use. Night-time denture wearing, inadequate denture cleaning, and the presence of visible denture deposits were significantly associated with denture stomatitis, whereas smoking did not show a statistically significant association. The findings highlight the importance of proper denture hygiene, removal of dentures during sleep, regular denture maintenance, and periodic prosthodontic evaluation. Patient education regarding appropriate denture care may play an important role in preventing denture stomatitis and maintaining healthy denture-bearing tissues.

REFERENCES

1. **Perić M, Miličić B, Kuzmanović Pfićer J, Živković R, Arsić Arsenijević V.** A Systematic Review of Denture Stomatitis: Predisposing Factors, Clinical Features, Etiology, and Global *Candida* spp. Distribution. *J Fungi (Basel)*. 2024;10(5):328. **PMID:** 38786683
DOI: 10.3390/jof10050328
2. **Singh HP, Bansal P, Thippeswamy SH.** Denture Stomatitis and *Candida albicans* in the Indian Population: A Systematic Review and Meta-Analysis. *Cureus*. 2023;15(9):e45182.
PMID: 37842362
DOI: 10.7759/cureus.45182
3. **Campos EN, et al.** Relation between the risk factors for the severity of denture stomatitis and quality of life of complete edentulous individuals: a cross-sectional study. *J Appl Oral Sci*. 2023;31:e20230192.
PMID: 38126577
DOI: 10.1590/1678-7757-2023-0192
4. **Ribeiro PM, et al.** Candida-associated denture stomatitis: clinical, epidemiological, and microbiological features. *Braz J Microbiol*. 2023;54(2):841–848.
PMID: 36940013
DOI: 10.1007/s42770-023-00952-0
5. **Al-Maweri SA, et al.** Efficacy of photodynamic therapy on candida colonization and clinical symptoms in denture stomatitis: a systematic review and meta-analysis. *BMC Oral Health*. 2024;24:84. **PMID:** 38229054
DOI: 10.1186/s12903-023-03789-z
6. **Xin YH, Ying TJ, Syeed MS, Veettil SK, Menon RK.** Comparative effectiveness of interventions for the treatment of denture stomatitis: A systematic review with network meta-analysis. *J Prosthet Dent*. 2023.
PMID: 36863936
DOI: 10.1016/j.prosdent.2023.01.007

7. **Mandali G, Sener ID, Turker SB, Ulgen H.** Factors affecting the distribution and prevalence of oral mucosal lesions in complete denture wearers. *Gerodontology*. 2011;28(2):97–103.
PMID: 20579108
DOI: 10.1111/j.1741-2358.2009.00351.x
8. **Shulman JD, Rivera-Hidalgo F, Beach MM.** Risk factors associated with denture stomatitis in the United States. *J Prosthet Dent*. 2005;93(4):359–366.
PMID: 15946181
DOI: 10.1016/j.prosdent.2005.01.003
9. **Puryer J.** Denture Stomatitis – A Clinical Update. *Dent Update*. 2016;43(6):529–530, 533–535.
PMID: 29148646
DOI: 10.12968/denu.2016.43.6.529
10. **Gendreau L, Loewy ZG.** Epidemiology and etiology of denture stomatitis. *J Prosthodont*. 2011;20(4):251–260.
PMID: 21496142
DOI: 10.1111/j.1532-849X.2011.00698.x
11. **Pereira-Cenci T, Del Bel Cury AA, Crielaard W, Ten Cate JM.** Development of Candida-associated denture stomatitis: new insights. *J Appl Oral Sci*. 2008;16(2):86–94.
PMID: 19089207
DOI: 10.1590/S1678-77572008000200002
12. **Baran I, Nalçacı R.** Self-reported denture hygiene habits and oral tissue conditions of complete denture wearers. *Arch Gerontol Geriatr*. 2009;49(2):208–213.
PMID: 18976822
DOI: 10.1016/j.archger.2008.07.012
13. **Kossioni AE.** The prevalence of denture stomatitis and its predisposing conditions in an older Greek population. *Gerodontology*. 2011;28(2):85–90.
PMID: 20082642
DOI: 10.1111/j.1741-2358.2009.00328.x
14. **Morel LL, Possebon AP da R, Faot F, Pinto LR de R.** Prevalence of risk factors for denture stomatitis in complete denture wearers. *Braz J Oral Sci*. 2019;18:e191414.
DOI/Article ID: 10.20396/bjos.v18i0.8655147
Note: This is a particularly relevant original study because it directly evaluates prevalence and risk factors in complete denture wearers.
15. **Mathivanan A, Sayeeganesh N, Raveendran A, Ramya D.** Treatment of Denture Stomatitis Using Modified Tissue Conditioners: A Systematic Review. *J Pharm Bioallied Sci*. 2023;15(Suppl 1):S98–S100.
DOI: 10.4103/jpbs.jpbs_593_22