Research Paper

# Prevalence of Denture Stomatitis in Patients Using Denture in Sari City, Iran, in 2020-2021

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## ABSTRACT

**Background and Purpose:** Denture stomatitis is an inflammatory condition in the oral mucosa which develops under the removable denture and affects a considerable percentage of denture users. Due to insufficient studies on this issue in Iran, we investigated the prevalence of denture stomatitis in patients using dentures.

**Materials and Methods:** In the current descriptive-analytical cross-sectional study, 130 patients referred to the dental school clinic and other dental clinics in Sari City, Iran, were examined using the census method. Demographic information about the patients, such as age, sex, systemic problems, and type of denture stomatitis (based on Newton's classification), were recorded. The denture was also clinically examined for its suitability in the mouth. After entering the data in SPSS, version 20, the study variables were analyzed through bivariate correlation, descriptive analysis, and frequency analysis.

**Results:** A total of 130 patients using dentures (85 male, 45 female) were studied. About 26.2% (n=34) of the patients had denture stomatitis, of whom 58.8% (n=20) were type II and 41.2% (n=14) were type III. There were significant differences between denture's age (P<0.001), patient's age (P=0.049), denture use during the day (P=0.002), diseases (P<0.001), denture cleaning frequency (P<0.001), and duration of denture use (P<0.001). Cigarette (P=0.093) and alcohol consumption (P=0.905), and sex (P=0.349) were not significantly associated with the prevalence of denture stomatitis.

**Conclusion:** The results of the current study presented a high prevalence of denture stomatitis in patients using dentures. Also, the denture's age, patient's age, cleaning frequency, duration of denture use, and appropriate denture significantly affected the prevalence of denture stomatitis.

**Keywords:** Denture, Prevalence, Denture stomatitis

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## 1. Introduction

Given the close relationship between oral mucosa and microorganisms, dentures in the oral cavity might provide difficulties for both the patient and the dentist. Mechanical irritation or inflammatory responses caused by dentures can develop modifications in the oral mucosa [1]. In other words, denture-induced oral mucosal lesions are caused by acute or chronic responses to microbial plaque, which can be formed due to denture materials or mechanical damage imposed by the denture. Nearly 50% of denture wearers have at least one mucosal lesion. These lesions form a heterogeneous group in terms of pathogenesis. Denture stomatitis, traumatic ulceration, and angular cheilitis are the most frequent mucosal lesions associated with dentures in older people [2, 3].

Denture stomatitis is a clinically diagnosed condition that affects people who wear removable dentures. This condition is characterized by edema and inflammation of the mucosa covered by the denture. Other symptoms, such as irritation, itching, and burning sensation, have also been observed; however, most patients with denture stomatitis are asymptomatic [4, 5]. This condition usually affects the palatal mucosa, which is covered by the denture, and the involvement of the lower jaw mucosa is uncommon. Previous studies indicate that this inflammatory process can affect anywhere from 15% to more than 70% of patients who wear dentures [6].

In 1962, Newton classified denture stomatitis into three categories: mild, moderate, and severe. In the mild form, local inflammation and punctate erythema are observed. Trauma imposed by the denture causes this type and is the most prevalent form in patients with normal oral hygiene who do not remove their dentures overnight. Erythema and general redness of the mucosa covering the denture are symptoms of the moderate form. In addition to the clinical aspects of the moderate type, papillary or granular hyperplasia is noticed in the severe form's central part of the palate, which can only be removed surgically [7, 8].

Different variables, such as oral candida infection, mucosal trauma, improper denture hygiene, and using dentures overnight, are associated with denture stomatitis [9]. Studies have also suggested that women and older people are more susceptible to denture stomatitis [5]. Nevertheless, conflicting results have been reported regarding the effect of salivary pH, sugar consumption, and smoking in patients suffering from denture stomatitis [10].

A systematic review of several observational and experimental studies analyzing the relationship between mucosal lesions and the use of dentures has suggested that the prevalence of denture stomatitis varies from 1.1% to more than 36.7% [11]. Other studies have reported a prevalence of 18.1% among 380 Thai patients [12]. Considering the controversy in the prevalence of denture stomatitis among people using dentures and the lack of sufficient studies on this issue in Iran, this study was conducted to investigate the prevalence of denture stomatitis in patients using dentures in Sari City, Iran, in 2020-21.

## 2. Materials and Methods

In the present descriptive-cross-sectional study, 130 patients referred to the Faculty of Dentistry and dental clinic centers in Sari from 2020 to 2021 were studied using the census method. The inclusion criteria included patients aged 41 to 70 with at least one full denture in their mouth and not under anti-inflammatory or antifungal treatment. Informed consent was obtained from all subjects. The study's protocol gained ethical approval from Mazandaran University of Medical Sciences (IR.MAZUMS.REC.1400.217). The sample size was calculated according to the findings of Naik and Pai's study [13] (Equation 1):

1. $n= Z^2_{1-\frac{\alpha}{2}} * \frac{p(1-p)}{d^2}$:

Demographic information such as the patient's age, sex, education level, and income was recorded. Additionally, information about denture hygiene, the duration of its use, denture use while sleeping, smoking and alcohol consumption, and the presence of diseases were gathered from the subjects using a checklist. The presence of denture stomatitis in the mucosa under the denture was diagnosed with clinical examination under the light source. Before the examination, the patients were asked to rinse their mouths. The diagnosis was recorded in the patients' file based on Newton's classification, mentioned in Naik and Pai's study [13]. The denture was also clinically examined for its suitability in the mouth. Examinations were carried out by a final-year dentistry student under the supervision of a specialist.

Data were analyzed using SPSS, version 20 software. A frequency table was used for denture stomatitis prevalence. The association between denture stomatitis prevalence and related factors was evaluated through t-test and Chi-square test. P≤0.05 was considered statistically significant.

## 3. Results

A total of 130 patients using dentures with an Mean±SD age of 66.23±4.08 years (ranging from 49 to 70) were investigated. Demographic features are shown in Table 1. The patients' Mean±SD income was 5.87±3.25 million tomans (ranging from 0 to 12). The Mean±SD number of years of denture use was 8.01±4.26 years.

Denture stomatitis was observed in 26.2% of the study population (34 people), of whom 58.8% (20 people) were classified as type II and 41.2% (14 people) as type III denture stomatitis.

Based on Table 2, there were significant relationships between the duration of wearing dentures per day, the age of the denture, and the patient's age with the prevalence of denture stomatitis.

No significant relationships existed between the prevalence of denture stomatitis and the patients' sex, smoking, or alcohol intake. On the other hand, denture stomatitis was much more common in patients with improper denture status, patients who used dentures while sleeping, and those with diseases. The frequency of denture stomatitis is reduced by raising the number of times the denture is cleaned during the day (Table 3).

## 4. Discussion

The findings of the current investigation suggested that denture stomatitis was prevalent in 26.2% of denture wearers. In line with our results, a study conducted in Iran also showed that the prevalence of denture stomatitis among their subjects was 21.6% [14]. Another study in Saudi Arabia also found the prevalence of denture stomatitis at 23.4% (60 patients) [15].

**Table 1.** Demographic characteristics of patients using dentures (n=130)

| Demographic and Clinical Variables | | No. (%) |
|---|---|---|
| Sex | Male | 85(65.4) |
| | Female | 45(34.6) |
| Level of education | Illiterate | 14(10.8) |
| | Undergraduate | 28(21.5) |
| | Diploma | 23(17.7) |
| | Associate degree | 13(10.0) |
| | Bachelor's degree | 40(30.8) |
| | Master's degree | 12(9.2) |
| Occupation | Retired | 35(26.9) |
| | Housekeeper | 29(22.3) |
| | Other | 66(50.8) |
| Systematic disease | None | 37(28.5) |
| | Kidney disease | 8(6.2) |
| | Diabetes | 52(40.0) |
| | Blood pressure | 28(21.5) |
| | Cardiovascular diseases | 5(3.8) |
| Number of complete dentures | One | 111(85.4) |
| | Two | 19(14.6) |
| Cleansing method | None | 18(13.8) |
| | Water | 112(86.2) |

**Table 2.** The relationship between the duration of Using dentures during the day, the denture's age, and the patient's age With the prevalence of denture stomatitis

| Variables | Denture Stomatitis Status | Mean±SD | P* |
|---|---|---|---|
| Duration of using the denture | No | 14.44±2.10 | 0.002 |
| | Yes | 15.70±1.52 | |
| Denture's age | No | 6.57±3.17 | <0.001 |
| | Yes | 10.58±4.22 | |
| Patient's age | No | 65.81±4.04 | 0.049 |
| | Yes | 67.41±4.02 | |

* The independent t-test.

**Table 3.** The association of different variables with the prevalence of denture stomatitis

| Variable | | No. (%) | | | Chi-square Test |
|---|---|---|---|---|---|
| | | Denture Stomatitis Status | | Total | |
| | | No | Yes | | |
| Sex | Male | 65(67.7) | 20(58.8) | 85(65.4) | P=0.349 df=1 $\chi^2$=0.876 |
| | Female | 31(32.3) | 14(41.2) | 45(34.6) | |
| Smoking | No | 61(63.5) | 16(47.1) | 77(59.2) | P=0.093 df= 1 $\chi^2$=2.825 |
| | Yes | 35(36.5) | 18(52.9) | 53(40.8) | |
| Alcohol consumption | No | 66(68.8) | 23(67.6) | 89(68.5) | P=0.905 df=1 $\chi^2$=0.014 |
| | Yes | 30(31.2) | 11(32.4) | 41(31.5) | |
| Denture status | Appropriate | 83(86.5) | 7(20.6) | 90(69.2) | P≤0.001 df=1 $\chi^2$=51.141 |
| | Inappropriate | 13(13.5) | 27(79.4) | 40(30.8) | |
| Denture removal at night | Never | 45(46.9) | 4(11.8) | 49(37.7) | P≤0.001 df=2 $\chi^2$=21.880 |
| | Always | 2(2.1) | 7(20.6) | 9(6.9) | |
| | Sometimes | 49(51) | 23(67.6) | 72(55.4) | |
| Number of denture cleansing times per day | Never | 8(8.3) | 9(26.5) | 17(13.1) | P≤0.001 df=3 $\chi^2$=20.724 |
| | Once | 39(40.6) | 22(64.7) | 61(46.9) | |
| | Twice | 43(44.8) | 3(8.8) | 46(35.4) | |
| | Tree times | 6(6.2) | 0(0) | 6(4.6) | |
| Systematic diseases | None | 35(36.5) | 2(5.9) | 37(28.5) | P≤0.001 df=4 $\chi^2$=28.485 |
| | Kidney diseases | 8(8.3) | 0(0) | 8(6.2) | |
| | Diabetes | 26(27.1) | 26(76.5) | 52(40) | |
| | Blood pressure | 22(22.9) | 6(17.6) | 28(21.5) | |
| | Cardiovascular diseases | 5(5.2) | 0(0) | 5(3.8) | |

On the other hand, the findings of Sharon Keziah et al. contradicted our findings; they observed denture stomatitis in 80 people, with a prevalence of 57.4% in women and 42.6% in men [16]. However, in the current study, the prevalence of denture stomatitis was higher in men (65.4%). The study population in Sharon Keziah's study was substantially higher, which could explain the disparity in the outcomes of these two investigations.

In the current study, the prevalence of denture stomatitis was reduced by increasing the number of denture cleaning times during the day. Similarly, Dos Santos et al. found that those who cleaned their dentures only once a week had the highest prevalence of denture stomatitis. In their study, 43.1% of patients used brushing, 42.3% used special soap, and 14.1% used special tablets to clean their dentures; Patients who used a toothbrush to clean their dentures were likelier to have denture stomatitis [17]. Previous research has also suggested that this condition is closely associated with denture hygiene and its use overnight [18].

Our findings show denture stomatitis was not significantly associated with alcohol consumption (P=0.905). In a study in 2011, out of 235 patients with oral lesions, about 180 (17.3%) consumed alcohol, and 268 (25.7%) smoked cigarettes. The authors suggested that additional care should be devoted to the oral mucosa in these patients, especially if they are unwell, old, have dentures, and smoke, since combining these factors increases the likelihood of oral lesions [19]. Moreover, other studies also support the association between the prevalence of oral mucosal lesions and alcohol consumption [20, 21].

According to Sharon Keziah et al.'s study, the incidence of denture stomatitis demonstrates a significant relationship with systemic diseases. Similar to their findings, in the present investigation, diabetes was shown to be the most associated systematic disease with the incidence of denture stomatitis [16].

The prevalence rates of this inflammatory disease were 20.6% and 79.4% in patients with appropriate and inappropriate denture status, respectively. Consistent with previous investigations [14, 15], our findings demonstrated a significant correlation between patients' denture status and the prevalence of denture stomatitis (P<0.001), and those with unsuitable denture status had a greater prevalence of denture stomatitis.

## 5. Conclusion

In the present study, the prevalence of denture stomatitis in patients wearing dentures was 26.2%. (34 people). The prevalence of denture stomatitis was statistically associated with the age of the denture, the patient's age, systemic diseases, smoking, using the denture overnight, the frequency of denture cleaning, the duration of using the denture, and the appropriate denture status. on the contrary, no significant relationship was observed between alcohol consumption and patients' sex, with denture stomatitis.

### Study limitations

The small sample size was one of the limitations of the current study; therefore, it is suggested to conduct more studies with larger sample sizes in the future.

## Ethical Considerations

### Compliance with ethical guidelines

The study's protocol gained ethical approval from Mazandaran University of Medical Sciences (Ethics Code: IR.MAZUMS.REC.1400.217).

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### Authors contributions

All authors equally contributed to preparing this article.

### Conflict of interest

The authors declared no conflict of interest.

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