



ORIGINAL ARTICLE



THE STUDY OF ETIOLOGICAL FACTORS ASSOCIATED WITH DENTURE STOMATITIS IN AN INDIAN POPULATION

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Abstract

Aim: The aim of this study is to find out the possible etiological factors for denture stomatitis (DS) in completely edentulous denture wearing patients by cross-sectional study.

Material and Methods: Population for this cross-sectional study consisted of 60 completely edentulous denture wearing patients residing in Ahmedabad, India. Data collection was done by questionnaire, oral examination and denture evaluation. All the data were analyzed using the software SPSS. Qualitative data were analyzed by Chi-square test and quantitative data were analyzed by student t test.

Results: This study showed 28% prevalence of denture stomatitis (17 out of 60 examined patients) in this study population. Many factors can be associated with DS, but present study showed significant correlation between Continuous denture wearing, Age of denture, Denture hygiene, Candidiasis, Lack of denture stability, Decrease VDO, High sugar intake, Hypo salivation, Low salivary pH.

Conclusion: Apart from infection, particularly with *C.albicans*, denture related factors can also cause denture stomatitis and these prosthetic factors appear to play mainly a traumatic role in the occurrence of DS. Patient should be motivated to practice proper denture wearing habits and maintenance of oral hygiene and follow a program of recall and maintenance for continuous monitoring of dentures and oral tissues.

Keywords: Denture stomatitis, Denture hygiene, Retention, Stability, Vertical dimension.

1 | INTRODUCTION

Denture stomatitis (DS) is defined as an inflammatory process of the oral mucosa underlying a removable, partial or total, dental prosthesis or appliance. It may affect from 15% to more than 70% of denture wearers.¹⁻³ Different authors have given different terminologies like: Denture sore mouth, chronic atrophic candidiasis, stomatitis prothetica, stomatopathia prothetica, erythematic candidiasis.^{4,5} Clinically the regions covered by the denture and sometimes tongue may appear erythematous and swollen and may have occasionally associated with angular cheilitis and/or median rhomboid glossitis. It is almost invariably asymptomatic or sometimes patient may feel burning sensation, soreness, rawness or dryness. Salivation may be disturbed.⁴⁻⁶ It is mostly seen in complete denture as the mucosal area covered by complete denture is greater than partial denture and frequently seen with upper complete denture as the protective mechanism of saliva may be inefficient and impression surface of upper complete denture holds denture plaque in contact with mucosa for a considerable period of time.⁷

2 | AIMS AND OBJECTIVES

The aetiology of denture stomatitis (DS) is not clear from the literature. Multiple factors are believed to be responsible for its initiation and progression.^{1,4,7,8} Its aetiology can be considered as multifactorial as it may be of infective and/or traumatic origin or it may be due to local and/or systemic causes.^{6,7} Most authors feel *Candida albicans* is the primary etiological agent. Defects in host immune mechanism as in diabetes mellitus, anemias, vitamin deficiency, menopause, and contraceptive pills may act as predisposing factors.^{4,6,9} Although review of literature suggests denture plaque, mucosal trauma, unstable denture, continuous denture wearing, lack of oral and denture hygiene, bacterial infection, allergy, heat accumulation under denture, persistent stress induced muscle activity can also causes DS.^{4,6-8} So the aims of this study are to: 1) To find out the prevalence of denture stomatitis in completely edentulous pop-

ulation. 2) To identify and characterize etiological factors for denture stomatitis in persons wearing removable complete dentures by means of cross-sectional study.

3 | MATERIAS AND METHOD

Population for this cross-sectional study consisted of 60 completely edentulous denture wearing patients aged between 40 to 86 years with a mean age of 68 years (32 male and 28 female) residing in Ahmedabad, India. Inclusion criteria include completely edentulous patients of greater than 40 years of age and having complete denture wearing of at least 6 months. Patient must be able to respond questionnaire. Patients who were uncooperative, having recently denture delivered, and were on antifungal or on any medication that may increase the risk of DS were excluded. Patient having any systemic disease that may predispose DS were also excluded from this study. The study protocol was approved by the local institutional ethical committee and it was in accordance with the Helsinki Declaration of 1975. Written Informed Consent was taken from each participant before commencement of data collection for study and Patient Information Sheet in local language was provided to each patient.

Data collection was done by questionnaire, oral examination and denture evaluation. Questionnaire include sociodemographic information like age, gender, address, education, occupation and health and behavior data like food habit, sugar consumption, addiction (smoking, tobacco chewing, alcohol) systemic diseases, and medication history. Oral exam-

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ination include examination of quality of residual alveolar ridge (Atwood classification), soft tissue covering the alveolar ridge, salivary flow, salivary pH and candida infection. Denture examination include evaluation of denture hygiene, age of denture, retention, stability, support, vertical dimension, last visit to dentist, method and frequency of denture cleaning.

All the data were analyzed using the software SPSS (IBM, Armonk, New York). Qualitative data were analyzed by Chi-square test and quantitative data were analyzed by student t test. P value less than 0.05 was considered as a statistically significant.

4 | RESULTS

This study showed out of 60 examined patients 17 patients were having denture stomatitis (DS). So the present shows 28% prevalence of DS in this completely edentulous denture wearing population. Many factors can be associated with DS, but present study showed significant correlation between Continuous denture wearing, Age of denture, Denture hygiene, Candidiasis, Lack of denture stability, Decrease VDO, High sugar intake, Hypo salivation, Low salivary pH and DS (Table 1).

5 | DISCUSSION

Denture stomatitis is the most common alteration on the palate of denture wearers.¹⁰ The results of the present study showed prevalence of DS 28% (17 out of 60 patients) which is in accordance with previous studies showing prevalence from 15-70% of prostheses wearers.^{1-3,8} The wide range of differences in prevalence may be explained by different diagnostic and group selection criteria such as age, institutionalized vs. non-institutionalized used in different studies. Newton has divided these lesions into 3 types according to severity: type I- localized inflammation or hyperemia points, type II- Diffuse erythema, type III- papillary hyperplasia.¹¹ In the present study, type 1 DS was most common; out of 17 DS patients, ten with type 1 (59%), six with type 2 (36%) and one with type 3 (5%). Many factors can be

associated with DS, but present study showed factors significantly related to DS are Continuous denture wearing, Age of denture, Denture hygiene, Candidiasis, Lack of denture stability, Decrease VDO, High sugar intake, Hypo salivation, Low salivary pH and DS.

In the present study out of 17 DS patients, 16 DS patients (94%) reported continuous wearing of denture and this is significantly related to DS. Oksala suggested that continuous wearing may provoke DS by enhancing local trauma.¹² Penhall suggested that the denture is considered to be a "plaque applicator". By holding plaque masses in contact with the oral mucosa for an extended period of time, the toxic effects as evidenced by mucosal abnormalities are predictable.¹³ Only two out of 43 control patients wore their dentures day and night. Interestingly one of these patients has smooth tissue fitting surface. A smooth surface prevents the formation and adherence of plaque. Indeed it has been shown that polishing and glazing the fitting surface of a denture is conducive to improved denture hygiene.¹⁴

In this study wearing a denture older than ten years is significantly related to occurrence of DS and out of 17 DS patients, 12 DS (71%) patients reported having dentures older than ten years. This is in accordance with the study conducted by Budtz-Jorgensen who stated that most of the old dentures are ill fitting and/or fitting surface may having porosities that make it more difficult to keep clean.¹⁵

The plaque that forms on unclean denture have been cited a local etiological factor for denture stomatitis.^{1,4,6-8} Abelson suggested that of the most commonly cited triad associated with denture wearers (ill-fit, trauma, unclean dentures) the plaque that forms on the tissue fitting surface of the dentures is probably of the greatest clinical significance.¹⁶ In this study, out of 17 DS patients, 14 DS patients (82%) had poor denture hygiene. Denture cleanliness was far better in the control subjects than in DS patients. This difference was statistically significant and is in agreement with the earlier studies. This is further supported by clinical and epidemiological studies that show a correlation between denture plaque scores and the presence and severity of denture stomatitis.^{17,18} Previously maintenance of good

TABLE 1: Etiological factors for denture stomatitis (Sample size 60)

Variable (risk factor) Sample size=60	Presence of Denture Stomatitis (No.=17)		Absence of Denture Stomatitis (No.=43)		P-value
	No.	Percentage	No.	Percentage	
Wearing dentures at night	16	94%	2	5%	0.000
Age of the dentures >10 years	12	71%	4	9%	0.000
Lack of denture retention	6	35%	12	28%	0.574
Lack of denture stability	9	53%	11	26%	0.043
Reduced VDO	10	59%	5	12%	0.000
Age of patient in years Mean (SD)	66 ± 3.2		68 ± 6.1		0.323
Female patient	10	59%	18	42%	0.235
Poor denture hygiene	14	82%	7	16%	0.000
Smoking	5	29%	12	28%	0.907
Regular sugar consuming	14	82%	10	23%	0.000
Candida Infection	13	76%	1	2%	0.000
>5 years since last visit to dentist	8	47%	21	49%	0.901
Reduced salivary flow	12	71%	8	19%	0.000
Salivary pH Mean (SD)	6.0 ± 0.5		6.5 ± 0.5		0.000
Denture brushing	13	76%	39	91%	0.144
Denture soaking in chemicals	4	24%	4	9%	0.144
Denture cleaning > 2 times in a day	12	71%	38	88%	0.096

S = statistically significant (P<0.05), NS = statistically not significant (P>0.05)

denture hygiene was considered to be of aesthetic importance, but recent studies have shown the benefits of good denture hygiene on oral mucosal health. Few studies have concluded that significant resolution of condition by efficient denture plaque control by mechanical or chemical denture cleaning.^{7,8,9,18}

Nater et al stated that unstable denture may have chronically traumatizing effect on the underlying mucosa.⁴ The situation may be aggravated by rocking of denture during chewing or speaking. Nine patient (53%) showing DS which was related to lack of denture stability. This is similar to the result of the study conducted by Figueiral et al who stated that the most likely reason for increased prevalence of DS in denture wearers was denture instability, which leads to more trauma to oral mucosa.⁶

Candida species are found in the oral cavity of 25-50% of healthy individual, including adults and children. When only denture wearers are considered, the value may increase to 60 up to 100%. Candida albicans is the most common species isolated from

denture wearers. In addition to this other species including *C. tropicalis*, *C. glabrata*, *C. parapsilosis*, *C. krusei* are also found in denture wearers.^{6,10,19} It is widely reported in the literature that Candida infection has a major role in DS.^{7,8,20} However some investigators considered that a number of microorganisms are responsible. Indeed, some studies conducted by Allison & Douglas have concluded that staphylococcus, streptococcus, pneumococcus, fusobacterium, bacterioids and other gram negative bacteria are equally important etiological factors.²¹

In this study there is significant relationship between hyposalivation, decreased salivary pH and DS. According to Figueiral et al this might be due to increased presence of yeasts in patients with hyposalivation and decreased salivary pH. Saliva inhibits yeast colonization and decreased salivary pH facilitates adhesion of *C. albicans*.⁶

In this study we failed to show any significant relationship between age, gender of the patient, smoking, method and frequency of denture cleaning method

and occurrence of DS.

6 CONCLUSION

It was concluded from the results of this study that: (1) The prevalence of DS in our population is 28% (type 1, 59%; type 2, 36% and type 3, 5%). (2) Denture related factors which favour the development of DS include: continuous denture wearing, older dentures, poor denture hygiene, unstable denture and reduced vertical dimension. (3) Prosthetic factors appear to play mainly a traumatic role in the occurrence of DS. (4) Infection, particularly with *C.albicans*, is significantly associated with DS. (5) Systemic factors like hyposalivation, reduced salivary pH and regular sugar consumption may act as contributory factors in the pathogenesis of DS.

Proper denture care is important not only for longevity of denture but also for health of patient's mouth. Dentures can cause oral mucosal lesions like denture stomatitis that could be prevented with post-insertion recalls to adjust defective dentures. Patient should be motivated to practice proper denture wearing habits and maintenance of oral hygiene and follow a program of recall and maintenance for continuous monitoring of dentures and oral.

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