



RESEARCH ARTICLE

FACTORS IN RELATION TO THE DENTURE MUCOSAL LESION AMONG DENTURE AND ORTHODONTIC PLATE WEARER: A PRELIMINARY INVESTIGATION

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ABSTRACT

Introduction: The primary aim of this study was to observe record and treat oral mucosal lesions associated with prolonged use of removable partial dentures/complete dentures and orthodontic plates. The following objectives were kept in mind to determine the type and the prevalence of denture stomatitis, angular cheilitis, flabby ridge, irritational fibroma and oral cancer in the removable complete and partial denture patients and orthodontic plates.

Materials and Method: A total of 502 patients using complete dentures/removable partial dentures for more than one year were selected out of those who attended the OPD of Dental College. After detailed history, the patients were subjected to thorough clinical examination. The denture bearing areas and adjacent mucosal surfaces were carefully scrutinized to observe any changes.

Results: In this study a total of 157 patients out of 503 presented with some or the other denture related mucosal changes i.e. 32.4%. Denture related mucosal changes are more frequently associated with partial denture wearers than complete denture wearers. The association between type of denture and denture related lesion was statistically significant. Twenty nine patients presented with more than one lesion. Most common oral mucosal lesion observed was denture stomatitis.

Conclusion: The most factor for denture related oral mucosa lesions were using the denture at night, age of prosthesis, and educational level. Dentists can help to prevent DML through making high quality denture and train the patients about methods and materials for denture cleaning and maintaining the prosthesis.

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INTRODUCTION

Replacement of missing teeth with suitable prosthesis is a very interesting and satisfying experience for the dental surgeon and more so for the patient. Every effort is made by the clinicians to reach high level of perfection, so that the patient will no longer miss his teeth. All these prosthodontics attempts are made to rebuild the patient's self-confidence, avoid social embarrassment and also to restore functionality. However, there are many undesirable and unexpected reactions of the human tissues to the foreign artificial objects (prosthesis) introduced in the oral cavity. Several researchers had found that various denture related mucosal lesions such as denture stomatitis, angular cheilitis, epulis fissuratum, traumatic ulcer can be correlated to various factors related to patient and

denture such as age of the patient, sex of the patient, type of the denture, various denture cleansing habits, no. of years single denture is in use, hygiene of the denture, denture condition like broken or worn out denture, Some of the patients has the habit of wearing the denture for the whole day and night (Coelho, 2004 and Sghaireen, 2015). Several investigators have correlated the wearing of removable dentures with oral lesions. With regards to the type of denture, denture-related mucosal lesions (DMLs) were observed more frequently in complete denture wearers than in partial denture wearers. The area of the oral mucosa covered by a complete denture is greater than that covered by a partial denture and may therefore increase the risk of DMLs (Jainkittivong, 2010). Denture-related mucosal lesions have been associated with denture plaque, Candida infection, poor denture retention and mechanical trauma. Dentures may predispose patients to the onset of mucosal lesions such as candidiasis, inflammatory or reactive hyperplasia and traumatic ulcer. The prevalence of

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denture-induced stomatitis, denture-related hyperplasia and angular cheilitis was higher in denture wearers (Arendorf, 1987). Denture-induced stomatitis is the most common lesion of clinical importance in denture wearers and is related to Candida infection (Kossioni, 2011). Several etiological factors including trauma, defective denture, denture hygiene, denture age, continuous denture wearing and xerostomia have been reported. Denture-induced stomatitis is also associated with the amount of tissue covered by a denture; this evidence is supported by the higher prevalence of denture-induced stomatitis in maxillary dentures (Jainkittivong, 2010). Similarly an orthodontic appliance can also have similar etiological factors like appliance hygiene, irritation/trauma due to wires of the appliance which may cause lesions on the oral mucosa. But none of the study has been carried out regarding removable plates. Lesions of the oral mucosa associated with the wearing of removable dentures may represent a reaction to constituents of the denture base material or a mechanical denture injury (Peltola, 1997). Among the acute reactions are traumatic ulcers, allergic reactions to denture materials, or acute infections. Among the chronic reactions are denture stomatitis caused by chronic infection or trauma, angular cheilitis, denture irritation hyperplasia, flabby ridges, and oral carcinomas. Chronic reactions are the most frequent. Angular cheilitis may have a multicausal etiology and is not necessarily related to the presence of dentures. Only a minor part of oral carcinomatous lesions have a possible association with the wearing of dentures (Budtz, 1981).

Dentures may be the direct cause of these conditions, due to changing of the environmental conditions of the oral cavity and loading of the oral mucosa. However, systemic conditions and general diseases may influence the oral environment and alter tissue responses and resistance (Mubarak, 2015). Oral lesions in denture wearers thus constitute a heterogeneous group of tissue changes both with regard to pathogenesis, clinical and histopathological appearance and possible complications. In order to make a proper diagnosis and to institute a relevant therapy and prophylaxis, it is necessary that the therapist has adequate medical knowledge and appropriate clinical and laboratory examinations are performed. It was therefore thought worthwhile to closely scrutinize the various oral changes associated with removable appliances. The primary aim of this study was to observe record and treat oral mucosal lesions associated with prolonged use of removable partial dentures/complete dentures and orthodontic plates. The following objectives were kept in mind to determine the type and the prevalence of denture stomatitis, angular cheilitis, flabby ridge, irritational fibroma and oral cancer in the removable complete and partial denture patients and orthodontic plates.

MATERIALS AND METHODS

A total of 502 patients using complete dentures/removable partial dentures for more than one year were selected out of those who attended the OPD of Govt. Dental College and hospital, Mumbai. This being a prevalence study, the patients were selected randomly that is with or without observable clinical changes. Special efforts were made to elicit the history of diabetes mellitus, anemia, malnutrition, immunosuppressive disorders, drug intake, tobacco and alcohol habit etc. which predispose the patient to oral mucosal changes. As this study involved appraisal of mucosal changes associated with

prosthesis, more emphasis on obtaining the following details about the dentures used was obtained.

- 1 The type of the denture
 - Complete denture
 - Removable partial dentures
 - Removable orthodontic plates
- 2 Duration of the use of denture i.e.
 - Since how long the present denture/appliance were in use
 - Number of previous dentures/appliance used and
 - At what age did the patient start wearing denture/appliance? (date of commencement of denture use)
- 3 Denture cleansing habits i.e.
 - How frequently and what technique were used to clean the dentures
- 4 Denture wearing pattern i.e.
 - Whether they were used only during day time and cleaned and immersed in water at night or
 - Were they used constantly day and night

After detailed history, the patients were subjected to thorough clinical examination. The denture bearing areas and adjacent mucosal surfaces were carefully scrutinized to observe any changes. The patients were seated in the Dental Chair and examined under a powerful illumination of the operatory light of the dental unit. Autoclaved mouth mirror and probe were used for examination. The oral cavity was also examined for normal variations such as torus; prominent linea alba etc. and pathological conditions such as cleft palate. Lesions if anywhere examined in greater detail and they were designated as below.

Cases of denture stomatitis were identified and graded into 3 categories. (Newton 1962)

Type I: A localized inflammation or pinpoint erythema.

Type II: Diffuse erythema involving a part or the entire denture covered mucosa.

Type III: A granular type (inflammatory papillary hyperplasia) commonly involving the central part of the hard palate and the alveolar ridges.

All the patients were informed about proper denture cleansing habit and denture using habit. All the patients with denture stomatitis were advised to discontinue the use of denture temporarily and were prescribed topical application of cotrimazole mouth paint thrice daily for 7 days. All the patients with angular cheilitis were also prescribed with topical application of antifungal (cotrimazole) and were referred for blood examination [haemoglobin estimation] and were advised new denture to be made with proper vertical relation. All the patients with epulis fissuratum, traumatic ulcer were advised to discontinue the use of denture and prescribed cotrimazole gel and referred to prosthodontic department for further management i.e. either adequate adjustment for preventing trauma [in ulcerative lesions] or fabrication of new dentures with correct marginal extension to prevent the epulis fissuratum. Flabby ridge patients were referred to prosthodontic department for the making of new denture with proper impression technique with adequate relief in the region of the flabby tissue. Surgical options were considered in cases where excessive flabby tissue was present. Irritational fibroma

was excised before making of a new denture. Cancer patients were subjected to biopsy and were referred to oncosurgeon. The data made available was subjected to statistical analysis and objective conclusions were drawn.

RESULTS

The total of 503 patients were examined, out of which 61.6% where males (n=310) and 38.4% were females (n=193). The age of patients was between 14 to 89 years with the mean age of patients 57.43 ± 15.8 years. 58.3% patients were complete denture wearers, 32.8% were partial denture wearers, 3.8% having complete denture in one arch and a partial denture in the other and 5.2% were removable orthodontic plate users. Table 1 shows the distribution of mucosal changes associated with different type of removable appliances. The numerical figure in the column mentions actual number of patients with the lesions and the percentage in the bracket. Out of 503 denture wearers 157 (31.2%) presented with appliance related mucosal lesions. Prevalence of appliance related mucosal lesions is slightly higher in partial denture wearers (34.5%) than complete denture wearers (32.4%) but the difference is not significant. 21% of patients individually wearing complete denture as well as partial denture showed evidence of related mucosal lesions and amongst the orthodontic plate users only 1 patient (3.8%) presented with oral lesions.

stomatitis was more common in partial denture wearers (25.5%) as compared to complete denture wearers (14.3%) and the relation was found to be statistically significant ($P=0.012$).

Table 2 shows distribution of the type of denture stomatitis and its location. The numerical figure in the column mentions the actual number of patients. The most common type of denture stomatitis observed was Type I i.e. in 50 patients followed by Type II in 27 patients and Type III in 10 patients. Most of the lesions were present with the maxillary arch and palate which was about 93.1% and in the mandibular arch it was 6.9%. In the mandibular arch all the lesions were of type I denture stomatitis.

Table 3 gives the distribution of flabby ridge and Epulisfissuratum in our study. The numerical figures in the columns mention the actual number of pathological lesions and not the number of patients. This is done because two such lesions can coexist in the same patient. (In this study, 2 patients presented with flabby ridge, epulisfissuratum and denture stomatitis and 2 patients presented with flabby ridge and epulisfissuratum). One patient was having epulisfissuratum in both the arches. Three patients were having flabby ridge in both the arches and one patient had flabby ridge in maxillary arch both anterior and posterior region. Similar to denture stomatitis, prevalence of flabby ridge is also more common in

Table 1. Prevalence of type of denture related mucosal changes in various types of dentures/appliance

Denture related mucosal lesion	Complete denture wearers	Partial denture wearers	Combined denture wearers	Orthodontic plate wearers	Total	(P value)
Denture stomatitis	42(14.3%)	42(25.5%)	2(10.5%)	1(3.8%)	87(17.3%)	0.014
Epulisfissuratum	18(6.1%)	2(1.2%)	0	0	20(4.0%)	0.412
Flabby Ridge	36(12.3%)	4(2.4%)	2(10.5%)	0	42(8.3%)	0.036
Traumatic ulcer	11(3.8%)	9(5.5%)	1(5.3%)	0	21(4.2%)	0.574
Angular chelitis	4(1.4%)	1(0.6%)	0	0	5(1.0%)	0.774
Lichenoid reaction	0	1(0.6%)	0	0	1(0.2%)	0.562
Irritational fibroma	0	1(0.6%)	0	0	1(0.2%)	0.562
Carcinoma	3(1.0%)	0	0	0	3(0.6%)	0.539
Total No. of wearers with lesions	95(32.4%)	57(34.5%)	4(21%)	1(3.8%)	157(32.4%)	0.012
Total No. of wearers	293	165	19	6	503	

Table 2. Prevalence type of denture stomatitis and its location

Type of denture stomatitis	Patients with Denture stomatitis	No. of lesions in the maxillary arch	No. of lesions in the mandibular arch
Type I	50	44 (88.0%)	6 (12.0%)
Type II	27	27 (100%)	0
Type III	10	10 (100%)	0
Total	87	81 (93.1%)	6 (6.9%)

Table 3. Prevalence of Flabby ridge and Epulisfissuratum and their location

Type of lesion	Maxillary Arch		Mandibular Arch	
	Anterior	Posterior	Anterior	Posterior
Flabby ridge	27	4	10	5
Total	31		15	
Epulisfissuratum	3	4	10	4
Total	7		14	

The most common mucosal lesion observed was denture stomatitis in 87 denture wearers (17.3%), flabby ridge was noticed in 42 denture wearers (8.3%), Epulisfissuratum in 20 denture wearers (4%), traumatic ulcer in 21 denture wearers (4.2%), angular chelitis in 5 patients (1%), and carcinoma in 3 denture wearer (0.6%). The least common lesions observed were lichenoid reaction (0.2%) and irritational fibroma (0.2%) in only one denture/appliance wearer each. When the type of denture related mucosal changes were analyzed denture

maxillary arch than mandibular arch. 67.4% of the flabby ridge lesions occurred in the maxillary arch. Most prevalent site for the lesion is maxillary anterior region i.e. 58.7% of flabby ridge lesions. Epulisfissuratum was found to be more common in the mandibular arch i.e. 66.6%. The most prevalent site for Epulisfissuratum was mandibular anterior region (47.6% of lesions were present in the mandibular anterior region). In this study totally 70 patients gave history of diabetes mellitus and 11 out of them presented with denture stomatitis. Out of 66

cases of hypertension 15 patients showed evidence of denture stomatitis. Out of 2 cases with immunosuppression 1 person showed denture stomatitis. No statistically significant correlation could be established between diabetes, hypertension, asthma and anemia and denture stomatitis. But association between immunosuppressive disorders and denture stomatitis was statistically significant. The prevalence of denture stomatitis was more common in 41-50 age group in which 26 (36.6%) out of 71 patients had denture stomatitis. The correlation between age group and denture stomatitis was found to be significant. Epulisfissuratum was found more commonly in 51-60 age groups. Flabby ridge was more common in 51-60 age groups. Traumatic ulcer was most commonly found in the 61-70 age groups. In this study it was observed that the prevalence of oral mucosal changes viz. denture stomatitis, Epulisfissuratum, and flabby ridge increased with the age of the patients.

In the association between different denture cleansing habits and denture related mucosal changes. The most common method of cleaning dentures was the use of toothbrush and toothpaste which was used by 322 wearers i.e. 64.0% of wearers. The other methods used in the descending order were toothbrush and soap (11.5%), denture cleansing agent (8.9%), soap only (6.0%), water only (5.4%), and brush only (4.2%). Mucosal lesions were most prevalent in denture wearers using only water for cleaning their denture (37.0%), second to those who use only brush for their use. The lesions were least prevalent in patients using denture cleansing agent to clean their dentures/appliances (22.2%). In the association between denture wearing habit and denture related mucosal changes. Denture wearing habit was divided into 2 groups according to the use of denture whether it is only during day or it is throughout day and night. 179 out of 503 (i.e.35.6%) appliance wearers examined in this study used their dentures throughout the day and even during the night time. 64.4% wearers used their dentures only during day.

Only 2 out of 26 orthodontic plate users wore the plate only during day time, rest 24 of them used their orthodontic plates throughout the day and night. Prevalence of lesion is significantly higher in patients wearing appliances throughout day and night as compared to those using denture only during day. Denture stomatitis is known to be strongly associated with hygiene of the denture and is depicted in our results as prevalence of denture stomatitis in patients maintaining poor denture hygiene was 33.6% as compared to 8.3% in patients having good denture hygiene. The association between denture hygiene and denture stomatitis was highly significant in this study. Flabby ridge is also more prevalent in poor denture hygiene patients (i.e. 9.2%) and fair denture hygiene patients (9.6%) as compared to good denture hygiene patients (i.e. 5.3%).

DISCUSSION

Removable dentures can injure oral tissues and the uses of dentures have been known to be associated with a high frequency of oral mucosal lesions. In the present study, as mentioned in Table 1; 151 out of 503 patients were having denture related mucosal lesions i.e. 30%. It was slightly more prevalent in partial denture wearers i.e. 34.5% than in complete denture wearers (32.4%). This finding is slightly less than the results found by other authors in their study as; Dundar *et al*⁹ found prevalence of denture related mucosal changes to be

36.4%, Nevalainen *et al.* (1997) in their study found denture related mucosal lesions to be 38%. This may be explained by the fact that, our study also included a group of young patients using orthodontic appliances who did not show any significant changes.

Denture Stomatitis

As stated by Jeganathan *et al.* (1992) denture stomatitis is not only the most common denture related mucosal lesion but is the most common oral mucosal lesion of clinical importance found in elderly population. The findings in our study support the observations made by Jeganathan *et al.* In our study it was found that maxillary arch is affected more by denture stomatitis than mandibular arch and it similar to that of Smith *et al.* (1979) and Helft *et al.* (1986). According to Budtz Jorgensen *et al* (1981) fit of the maxillary denture contributes to the infection. It creates a relatively acid and anaerobic milieu that provides optimal environmental conditions for candida growth. As there is vacuum created under the maxillary denture salivary antibodies do not reach to the mucosa covered by the maxillary denture. It is also believed that the prevalence of denture-induced stomatitis is related to the area of tissue covered by a denture, as the maxillary denture covers more area it has more prevalence.

As seen from our results that prevalence of denture stomatitis is more in partial denture wearers than complete denture wearers (25.5% and 14.3%) which is similar to Dundar *et al* (2007) (37.3% in partial denture wearers and 35.7% in complete denture wearers) and Jainkittivong *et al* (2010) (22.7% in partial denture wearers and 11.6% in complete denture wearers) as in their study also partial denture wearers were affected than complete denture wearers. Most of removable partial dentures worn by these patients were made in acrylic and to a certain extent may be found wanting in perfection in occlusion and fitting which may have contributed to trauma. Trauma is considered to be one of the predisposing factors in denture stomatitis. Emami *et al* (2008) showed that continuous traumatogenic occlusal contact could increase the frequency of denture stomatitis. The ability of adherence of Candida species to saliva-coated acrylic resin may play a role in establishing itself on the denture surface. Also, the acrylic based dentures were less stable than the cobalt chrome based dentures. More stable dentures offer more consistent biting force vectors, thereby reducing trauma to the denture-bearing mucosa.

It is observed that with advancing age, the oral mucosa becomes more permeable to noxious agents and more vulnerable to mechanical damage. Hypo salivation in old age is believed to be caused by an increasing number of diseases and their treatment with multiple medications (Emami, 2008). It is reported that continuous wearing of maxillary complete denture causes blocking of the minor salivary glands which further adds to xerostomia associated with Hyposalivation noted in old age and hence predisposes to candida infection (Zissis, 2006). According to Budtz Jorgenson *et al.* xerostomia in old age is related to the atrophy of minor salivary glands which further predisposes old age patients to denture stomatitis. In this study it was found that denture stomatitis is more prevalent in elderly age group. This finding is similar to the finding of Baran *et al.* (Baran, 2009), Jainkittivong *et al.* (2010). According to Boucher removal of the denture during night gives relief to the underlying tissue from the continuous

excessive pressure exerted by the denture and increases the blood circulation of the underlying tissue. The direct predisposing factor for candida associated denture stomatitis is the presence of the denture in the oral cavity. Thus, the infection prevails in patients who are wearing their dentures continuously for 24 hours and changing the habit of continuous use will lead to improvement/disappearance of the lesion. Denture hygiene is also related to the age of the denture used. This relationship between age of denture and level of cleanliness was found to be highly significant in the study of Hoad-Reddick *et al.* (1990). Older dentures have compromised denture hygiene as compared to newer dentures. Denture hygiene is also one of the contributing factors towards denture stomatitis. The oral flora may be altered as a result of food debris and plaque that collects between the impression surface of the denture and the palate. In addition, the saliva that is present between the maxillary denture and the mucosa may have a lower pH than usual. So if the denture is not cleaned properly to remove all the food debris and plaque on a regular basis it can lead to inflammation of the underlying mucosa and hence denture stomatitis. In our study it was found to have a highly significant association with denture stomatitis. As is stated in our results prevalence of denture stomatitis in patients maintaining poor denture hygiene was 33.6% as compared to 8.3% in patients having good denture hygiene. In this study denture stomatitis was found to be more prevalent in broken and wornout dentures (28.6%) as compared to acceptable dentures (21.1%). The results are statistically significant. This finding is comparable with the results of Freitas *et al.* (Freitas, 2008).

Flabby Ridge

Flabby ridge was the second most common denture related lesion found in our study and its prevalence was 8.3%. It is less as compared to the results of Helft *et al.* (1986) who had found flabby ridge in 22.05% patients and Budtz Jorgenson *et al.* have found the prevalence to be 20% in their non-randomized group of patients. As reported by Budtz Jorgenson flabby ridge is more common in maxillary anterior region. In this study also maxillary anterior region was found to be the most common site for flabby ridge. It is probably a sequel of excessive load of the residual ridge and unstable occlusal condition. It is possible that an edentulous patient may fail to learn the art of mastication at the beginning and may develop the habit of biting excessively with the anterior portion of the jaw resulting in flabby condition at the ridge. Budtz Jorgensen states that flabby ridge was more common in female as compared to males (Jainkittivong, 2010). Result in our study also shows that flabby ridge is more common in females as compared to males. It is possible that the greater prevalence of flabby ridge in the females may be related to more continuous use of dentures and hormonal changes e.g. osteoporosis after menopause. Some studies have shown that persons wearing complete dentures day and night lose more alveolar bone than those wearing their dentures only during the day. However, this finding was not confirmed in other studies.

In our study prevalence of flabby ridge was more in patients using denture throughout day and night (10.6%) as compared to patients using denture only during day (7.1%). About 60% of patients having flabby ridge use their denture throughout day and night. In our study it was found that prevalence of flabby ridge is more in patients with wornout and broken dentures as compared to acceptable dentures. This finding

correlates with that of Helft *et al.* and Turker *et al.* It is well understood that the worn out area of the denture is comparatively under greater occlusal stress than the other areas and hence it seems to be logical to suppose that flabby ridge will be more commonly associated with the worn out dentures.

Epulis Fissuratum

Epulis Fissuratum is another lesion in which there is hyperplasia of oral tissue caused due to denture. This condition is also termed as fibrous inflammatory hyperplasia and denture hyperplasia. In our study around 4% of patients has epulis fissuratum. This finding is comparable with those of Garcia-Pola *et al.* (2002), (5.2%). In Dorey *et al.* (1985) study prevalence of epulis fissuratum is 2% which is less than our study. In our study epulis fissuratum was more common in the mandibular arch and the common site is mandibular anterior region. Even in the study of Helft *et al.* (1986), mandibular arch is the most commonly involved arch. In our study it is found that Epulis fissuratum is more common in complete denture wearers as compared to partial denture wearers. In our study it was found that maximum no of patients with epulis fissuratum were in fifth and sixth decade of life. The inflammatory fibrous hyperplasia was also related to the integrity of the prosthesis. Alterations to the integrity of the prosthesis may have caused a reduction in stability, causing trauma to the supporting mucosa. And hence giving rise to hyperplasia in the traumatized oral mucosa (Freitas, 2008). In our study it was found that Epulis fissuratum was more prevalent in worn out dentures (5.7%) as compared to that of acceptable dentures (4.1%). This finding is comparable with studies of Helft *et al.* (1986).

Traumatic Ulcer

There can be a breach in the continuity of oral mucosa related to new dentures with sharp acrylic spicule or overextended flanges or it can be related to ill-fitting old dentures and/or sharp edges of broken margins. In our study as the patients examined were using dentures for more than one year main cause of traumatic ulcer due to denture was sharp edges of broken dentures or due to accidental biting with the ill-fitting denture. Because the prevalence of mucosal ulcers is not very high, they are not considered to be the main mucosal problem among the denture wearer. However, the association between mucosal ulcers and squamous-cell carcinoma should always be kept in mind when treating patients with this type of lesion (Silverglade and Stablein, 1988). In this study prevalence of traumatic ulcer is more in partial denture wearer than that of complete denture wearers. In this study we have found that traumatic ulcer is slightly more prevalent in broken dentures (5.5%) as compared to acceptable dentures (5.0%). Sharp edges of broken denture or clasps of the removable partial dentures can cause trauma to the oral mucosa.

Angular Chelitis

Several oral mucosal disorders were noted that did not directly involve the denture-bearing mucosa but were related to the presence of dentures. Dentures are one of the predisposing conditions which are the reasons for including lesions of the oral mucosa associated with the wearing of removable dentures. In our study 5 patients of angular chelitis were detected out of 503 patients examined (1.0%). Although prevalence is very less in the present study it is noteworthy to

mention that out of 5 patients of angular cheilitis 3 patients were having concomitant denture stomatitis as well. This finding is also revealed by Smith *et al.* (1979), who in their study found that of the subjects with angular cheilitis, 32% also had denture stomatitis. In the present study it was also found that out of 5 patients having angular cheilitis 3 patient were having wornout dentures and one patient has broken denture. These finding is comparable with that of Dorey *et al.* (Dorey, 1985). It is assumed that over closure of the jaws will produce folds at the angles of the mouth in which saliva tend to collect. The skin subsequently becomes macerated, fissured, and secondarily infected. Healing of the lesion has been reported subsequent to prosthetic treatment including increasing vertical dimension of occlusion.

Irritational Fibroma

Acute and chronic irritation from defective or ill-fitting dentures may injure the oral mucosa. If the tolerance level is exceeded, injury and inflammation will result and the denture may not be worn comfortably by patients, and denture “sores” are often reported in association with ill-fitting dentures. On the other hand, if the trauma is tolerated by the tissue, a fibrous response is elicited and hyperplasia may develop. Irritational fibroma were related to denture wearing as this lesion was more reactive than neoplastic in nature. In this study only one patient had irritational fibroma on the lower lip and the patient was using mandibular partial denture wearer and was in broken condition. No statistical association could be established as a single patient presented with this lesion.

Oral Carcinoma due to denture

The oral mucosa is exposed to lifelong mechanical, chemical and thermal stress which often results in malignant alterations and oral cancer. Denture also can cause chronic irritation to the denture bearing and non-denture bearing area and can be an etiology for oral cancer. In the study we found 3 patients with oral carcinoma out of the 503 patients we examined (i.e. 0.6%). Out of these 3 patients, two patients were not having any tobacco related habit. All the three patients were male and had oral carcinoma on the mandibular alveolar ridge in the denture bearing area. All the patients were complete denture wearers. But no association was found with any of the predisposing factors.

Oral lesions related to orthodontic appliances

The idea behind including removable orthodontic appliances also in this study is that both removable appliances and dentures have the same basic components i.e. retainers and denture/appliance base. In our study only one patient had inflammation under the appliance i.e. few erythematous areas were seen on the palate. One of the reasons behind maxillary arch having denture stomatitis is that as the denture fits properly creating vacuum under the denture, so the salivary antibodies don't reach there, which creates an unrestricted flourishing environment for candida and other causative organisms. In this study all of the patients had maxillary orthodontic plate. But only one patient had the lesion. The probable explanation for this is that as orthodontic plate is not dependent on negative pressure for its retention and vacuum is not created under the orthodontic plate and hence the environment is not as favorable as it is under dentures. It was

noteworthy that out of 26 patients using orthodontic plate examined, 24 worn the appliance throughout the day and night. The use of denture 24 hours a day causes denture hygiene difficult and irritants (plaque on the impression surface) is in contact with the mucosa for a longer period of time predisposing to inflammation but as the orthodontic plates are worn by very young patients they can keep their denture clean as is seen from our study that 19 patients had good appliance hygiene and none of the patient had a poor appliance hygiene.

Correlation between systemic history and denture related mucosal changes

Most of the patients using dentures are of old age group whose systemic condition is a little bit compromised. In our study mean age of the patients was 57.43 ± 15.8 . Many systemic conditions like diabetes mellitus, hypertension, asthma, anemia and immunosuppressive disorders do occur in patients as age advances. Thinking logically diabetes mellitus and immunocompromised patients has increased risk of getting denture stomatitis. The present study had 70 patients of diabetes mellitus, 66 patients with hypertension, 15 patients were asthmatic, and 2 patients were immunocompromised. Out of 70 diabetic patients 11 were having denture stomatitis i.e. 15 of 66 hypertensive patients were having denture stomatitis, but the point to be noted is 1 out of 2 immunocompromised patients has got denture stomatitis, but the results were not statistically significant. In Dundar *et al.* (2007), study the logistic regression model included diabetes mellitus as a significant risk factor for having denture stomatitis and denture hyperplasia. The xerostomia associated with diabetes seems to increase the traumatic effect of dentures, especially when they are used for a longer period than they should be. Espinoza *et al.* reported that diabetes mellitus was also included in their logistic regression model for Denture related lesion, but the relationship was not significant.

Conclusions

Denture related mucosal changes are more frequently associated with partial denture wearers than complete denture wearers. The association between type of denture and denture related lesion was statistically significant. Most common oral mucosal lesion observed was denture stomatitis which was present in 87 patients out of 503 patients examined. The most factor for denture related oral mucosa lesions were using the denture at night, age of prosthesis, and educational level. Dentists can help to prevent DML through making high quality denture and train the patients about methods and materials for denture cleaning and maintaining the prosthesis. Dentists should be instructing the patients for removing the denture at night and routine follow-up visits. The denture wearers should be educated in the importance of periodic examination due to changes of supporting tissues and early detection of mucosal lesions to maintain their oral and denture hygiene in optimum level.

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