Original Article

Prevalence of denture-related oral lesions among patients attending College of Dentistry, University of Dammam: A clinico-pathological study

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Abstract

Background: Heterogeneous groups of oral lesions are likely to develop among denture wearers. The objectives of this study were to determine the exact prevalence of oral lesions among denture wearers attending the clinics of the College of Dentistry, University of Dammam. **Materials and Methods:** All denture wearers attending the dental clinics in the period between January 2012 and April 2013 were included in this study. Of the total 210 patients, 166 (79%) were males and 44 (21%) were females. Comprehensive oral examination was performed for all patients. Any denture-induced lesion was biopsied. Data collected were analyzed using SPSS program. **Results:** Oral lesions were found in 20.5% of the cases under study (43 out of the total 210 denture wearers). Denture-induced fibrous hyperplasia was the most common type of lesion detected (41.9%). A significant correlation (P = 0.004) was found between the type of denture and oral lesions in this study. **Conclusion:** The prevalence of denture-induced oral lesions was found to differ significantly from that reported in other studies. The diversity of these lesions among different studies depends on the quality and materials of dentures delivered, the techniques used, and the methods of patients' instructions adopted.

Key words: *Denture wearer, oral mucosal lesions, prosthesis*

INTRODUCTION

Oral lesions in denture wearers constitute a heterogeneous group of tissue changes, both with regard to pathogenesis, clinical and histopathological appearance, and possible complications. Dentures may be the direct cause of these conditions, due to changing 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. Different medical conditions associated with hyposalivation and parafunctional activity may result in higher risk of oral mucosal alterations.[1,2] Dundar and IlhanKal[3] reported diabetes mellitus as a risk factor for denture stomatitis and denture hyperplasia.

The prevalence of oral mucosal lesions has been shown to increase with age.[4,5] Coelho *et al*.[6] have explained

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that tooth loss increases with age, and a removable partial denture (PD) may be later substituted by a complete denture (CD). Some authors suggest that length of denture use increases with increasing age of patients, and that they are reluctant to restore or replace old dentures, which can cause oral lesions.[7]

Several lesions are found to be more frequent in females than in males.[8-10] This high frequency of lesions among females is not well understood. It has been suggested that it may be due to the fact that female patients wear their dentures more often and perhaps for longer periods of time for esthetic purposes.[11]

The association between poor oral hygiene and denture-related oral mucosal lesions (DMLs) is not well established because this relationship is complex. The literature suggests that defective dentures create additional opportunities for lodged food and limit the natural cleaning action by the tongue, lips, and cheeks.[12-14] Denture cleaning methods may affect the condition of dentures, and pigmentation and abrasions in dentures occur with the use of toothpaste or toothbrush. Patients often think that ordinary teeth cleaning methods are suitable for denture cleaning.[15,16] The mechanical cleaning combined with effective and inexpensive chemical aids, such as sodium hypochlorite and coconut soap, seems to be more appropriate.[17]

DMLs may represent acute or chronic reactions to denture plaque, yeast, constituents of the denture base material, poor retention, and mechanical injury.[10,12,18] Acute and chronic irritation from defective or ill-fitting dentures may injure the oral mucosa.[1,6,19,20]

Removable dentures can injure oral tissues and the use of dentures is associated with a high frequency of oral mucosal lesions.[4,7,12,21,22]

In another study of oral mucosal lesions among elderly persons,[13] 52% of the wearers of both full and removable PDs had proliferative or ulcerative lesions. The fact that the area of the oral mucosa covered by a total prosthesis is greater than that covered by a PD may be an important factor for this increase in full denture wearers. The irritant effect of the denture base materials[23] on the tissue changes in these patients should not be underestimated.

Traumatic ulcers (TUs) most commonly develop within 1–2 days after insertion of new dentures, but can also be found in old, ill-fitting dentures, because of overextended denture flanges, or unbalanced occlusion. These were found to occur more frequently during the first 5 years of denture use.[4,6] TUs have been found in 2–3% of institutionalized denture wearers.[24]

Denture stomatitis (denture sore mouth) is a term used to describe inflammatory changes in the oral mucosa of denture-bearing tissues. These changes are characterized by erythema and are found under complete or PDs in both jaws, but more frequently in the maxilla.[24] In a study of 463 randomly selected geriatric denture wearers, the prevalence of denture stomatitis was found to be as high as 65%.[25] The lesions are seen more frequently among women than men.[26-28]

Angular cheilitis is the clinical diagnosis of deep fissures affecting the angles of the mouth and has an ulcerated appearance.[29] Moskona and Kaplan[7] have suggested that loss of vertical height is not as important a cause for angular cheilitis as is active colonization by *Candida*, associated with denture wear and poor oral hygiene. The prevalence of angular cheilitis among wearers of CDs has been shown to vary between 8 and 30%.[24]

Angular cheilitis is seen more frequently in women than in men and the condition seems to be associated with the wearing of removable dentures, but not with an edentulous state *per se*.[30,31]

A common tissue reaction to ill-fitting dentures is the occurrence of tissue hyperplasia of the mucosa in contact with the denture border (inflammatory hyperplasia, epulis fissuratum, redundant tissue). Denture irritation hyperplasia was found in 5–10% of non-randomized groups of denture wearers.[24] In a large investigation on the prevalence of oral mucosal lesions in different age groups, denture irritation hyperplasia was found in 6.3% among subjects aged 55–64 and in 11.5% among those aged above 65.[31]

The lesions are the result of chronic injury by unstable dentures or by thin, overextended denture flanges. The proliferation of tissue may take place relatively quickly after prosthetic treatment.[32]

After replacement or adjustment of the dentures, the inflammation and edema may subside and produce some clinical improvement of the condition.

Flabby ridge (removable and extremely resilient alveolar ridge) is due to a replacement of bone by fibrous tissue.[12] The condition is found more often in women than in men and is usually located in the anterior region

of the maxilla.[32] Flabby ridges in denture wearers should be removed surgically in order to minimize progressive reduction of residual ridges.

It is usually claimed that the possibility of malignant transformation of denture-induced lesions should be considered. In a retrospective study of 560 patients with intraoral epidermoid carcinomas, of whom 204 wore dentures, a direct connection between irritation by the prostheses and development of carcinoma was claimed in 86 of the cases.[33] The carcinomas were localized to the palate, the alveolar ridges, and the mucobuccal and lingual folds. Seventy percent of the tumors were found in women, although oral carcinomas as a whole occur more frequently in men. Chronic irritation from ill-fitting or defective dentures has often been mentioned as a contributing factor in the development of oral cancer.[12,34,35]

The complete denture wearers (CDWs) should be educated about the importance of periodic examination due to the changing supporting tissues for detection of early mucosal lesions, in order to maintain their oral and denture hygiene at an optimum level.[36]

Moreover, to prevent or minimize the extent of the lesions, denture wearers should be recalled regularly for an examination of the oral cavity and the dentures. It is important that the examination is carried out by a person who has adequate medical knowledge.[12]

None of these studies seem to provide definite evidence that oral carcinomas may develop due to chronic mechanical or chemical irritation by dentures; however, the studies underline the necessity of strict and regular control of all subjects wearing removable dentures.

DMLs can be prevented if denture wearers take proper care of their dentures and maintain good oral hygiene.

Although no substantial evidence is reported, malignant lesions such as squamous cell carcinoma and gingival carcinoma have been associated with chronic irritation. Therefore, dentists can play a significant role in educating patients and in the early detection of malignant lesions in denture wearers.

No similar study was done in this region [Eastern Province, Kingdom of Saudi Arabia (KSA)]. Aims of this study were to determine the exact prevalence of oral lesions among denture wearers attending the clinics of the College of Dentistry, University of Dammam, and to find out any correlation between these lesions and different types of dentures.

MATERIALS AND METHODS

In this investigation, all denture wearers attending the College of Dentistry, University of Dammam, KSA, in the period between January 2012 and April 2013 were screened and examined. Patients from both sexes and different age groups were examined using sterilized patient examination kits and under the dental chair light. The oral mucosa of denture wearers was examined and their dentures were inspected. This was followed by categorization of the patients and then the lesions were tabulated and documented.

A predesigned questionnaire was used for each case, which included the following variables: Patient's personal data (name, address, age, gender), type of prosthesis worn, period of using that denture, type of dentures (removable/fixed, maxillary/mandibular or both), and the material used (acrylic, gold, or chrome cobalt). Other important variables included were medical history, dental history, history of medications, daily home care, duration of leaving the prosthesis outside the mouth, whether the prosthesis was used for the first time (new set), and any history of fracture and relining or repair of the denture. All patients were evaluated radiographically using digital panoramic radiographs.

Biopsy taking

Biopsies were taken from all lesions associated with dentures to confirm the clinical or working diagnosis. The process included removal of a small piece of tissue under local anesthesia using disposable punch biopsy instrument and syringe needles. All specimens were removed with tissue forceps and immediately placed in containers with fixative (10% formalin). The sterile glass containers had wide mouth and were covered tightly with leak-proof caps. Each container was then labeled and sent to the oral histopathology laboratory for further processing.

Laboratory procedure

Each of the biopsies was fixed with formalin and processed according to the routine (H and E) histopathological procedures. Stained slides were evaluated under light microscope to confirm the working diagnosis.

Ethical approval

Before starting this study, the research project was approved by University of Dammam Standing Committee for Research Ethics on living creatures.

Statistical analysis

Data obtained in this study was analyzed using SPSS, PC Statistical Package. Statistical analysis was performed with Chi-square test. $P < 0.05$ and confidence interval (CI) at 95% was considered statistically significant.

RESULTS

This study included 210 patients who came to the Prosthodontic Clinics, College of Dentistry, University of Dammam in the period between January 2012 and April 2013. Of the total 210 patients, 166 (79%) were males and 44 (21%) were females. Majority of the males reported were in the fifth and sixth decades, while the majority of the females reported were in the fourth and fifth decades of life.

There were 143 (68.1%) CDWs, 63 (30%) partial denture wearers (PDWs), and 4 (1.9%) complete denture and partial denture wearers (CD and PDWs). Most of the denture wearers were found to have CDs in both jaws [107 (51%)], followed by PDs in both jaws [55 (26.2%)], CDs of either jaws [36 (17.1%)], PDs of either jaws [8 (3.8%)], and a combination of CDs and PDs [4 (1.9%)].

Prevalence of DMLs among denture wearers attending the clinics of the College of Dentistry, University of Dammam during the period January 2012 to April 2013 showed a total of 43 lesions. These lesions were found in 43 (20.5%) cases of the total 210 patients.

The distribution of the lesions between the genders is listed in Table 1. Out of the total 210 patients, 36 cases (17.14%) were found in males and 7 cases (3.3%) in females. Denture-induced fibrous hyperplasia (IFH) was the most common lesion noted in this study [8.57% (18 cases)] [Figure 1].

Table 1: The distribution of the lesions between the genders

Lesions	Males (%)	Females (%)	Total (%)
Traumatic ulcer	8 (3.8)	2 (0.95)	10 (4.76)
Denture-induced fibrous hyperplasia	15 (7.14)	3 (1.43)	18 (8.57)
Rubber-related palatal lesions	6 (2.86)	2 (0.95)	8 (3.8)
Chronic atrophic candidiasis	7 (3.3)	0 (0)	7 (3.3)
Total	36 (17.14)	7 (3.3)	43 (20.48)

Out of the total number of patients (210). Statistical differences were insignificant with regard to the gender and number of lesion

TU lesions ($n = 10$) and chronic atrophic candidiasis (CAC) ($n = 7$) were found to occur mostly in denture wearers of the age group 40–55 years, while IFH ($n = 18$) and rubber-related palatal lesions (RPL) ($n = 8$) were mostly noted in 55-70 year old denture wearers ($P = 0.001$) [Figure 1]. This distribution is demonstrated in Table 2.

The relationship between the lesions and the duration of denture use is presented in Table 3. The DMLs were found to be more frequent in patients with more than 4 years of denture use with the following distribution: IFH, 14 out of 18; RPL, 6 out of 8; and CAC, 7 out of 7; while TU was found to be more frequent in patients who wore dentures for less than 4 years (6 cases out of 10). The incidences of these lesions were found to be increased with increase in the duration of denture usage.

The prevalence of DMLs in relation to a specific group of denture wearers is listed in Table 4.

The most common DMLs observed in the study were IFH (41.9%). The other DMLs noted in decreasing order of prevalence were TU (23.3%), RPL (18.6%), and CAC (16.2%).

Histopathological findings

Histopathologically, lesions diagnosed as denture-related TUs showed microscopically non-specific ulceration with mixed inflammatory cell infiltration and without any features of epithelial dysplasia or malignancy [Figure 2].

Cases with IFH showed histopathologically well-vascularized fibrocollagenous tissue covered by squamous stratified epithelium (ortho or parakeratinized [Figure 2].

With regard to the RPL, they appeared clinically as atrophic mucosa in the mid-palatal area where the

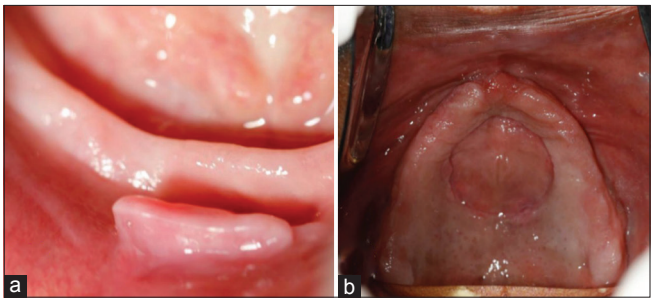

Figure 1: Clinical photograph showing (a) denture-induced fibrous hyperplasia in the mandibular labial vestibular area and (b) well-defined lesion in the mid-palatal area related to the use of suction rubber to improve denture retention

Table 2: The distribution of lesions according to age groups

Age group	No. of patients (%)	Lesions (%)				Total (%)
		TU	IFH	RPL	CAC	
40-55 years	158 (75.2)	8 (80.0)	2 (11.1)	2 (25.0)	7 (100)	19 (44.2)
55-70 years	52 (24.8)	2 (20.0)	16 (88.9)	6 (75.0)	0	24 (55.8)
Total	210 (100)	10 (23.3)	18 (41.9)	8 (18.6)	7 (16.2)	43 (100)

**Shows significant difference of type of lesions according to age (P<0.001). TU=Traumatic ulcers, IFH=Denture-induced fibrous hyperplasia, RPL=Rubber-related palatal lesions, CAC=Chronic atrophic candidiasis*

Table 3: The relationship between the lesions and denture wearing duration

Period	Lesions (%)				Total (%)
	TU	IFH	RPL	CAC	
<4 years	6 (60.0)	4 (22.2)	2 (25.0)	0	12 (27.9)
>4 years	4 (40.0)	14 (77.8)	6 (75.0)	7 (100)	31 (72.1)
Total	10 (23.3)	18 (41.9)	8 (18.6)	7 (16.3)	43 (100)

**Shows significant difference of type of lesions according to length of period (P=0.023). TU=Traumatic ulcers, IFH=Denture-induced fibrous hyperplasia, RPL=Rubber-related palatal lesions, CAC=Chronic atrophic candidiasis*

Table 4: The prevalence of DMLs in relation to a specific group of denture wearers

Lesions	CDWs *n*=147 (%)	PDWs *n*=67 (%)	Total *n*=214* (%)
TU	3 (10.0)	7 (53.8)	10 (23.3)
IFH	16 (53.3)	2 (15.4)	18 (41.9)
RPL	8 (26.7)	0	8 (18.6)
CAC	3 (10.0)	4 (30.8)	7 (16.2)
Total	30 (69.8)	13 (30.2)	43 (100)

**Total number is 210; however, 4 cases were using partial and complete dentures at the same time. Shows significant difference of type of lesions between CDWs and PDWs (P=0.004). CDWs=Complete denture wearers, PDWs=Partial denture wearers, TU=Traumatic ulcers, IFH=Denture-induced fibrous hyperplasia, RPL=Rubber-related palatal lesions, CAC=Chronic atrophic candidiasis*

maxillary dentures used to have a small, rounded piece of rubber for retention. Histopathologically, these lesions showed atrophic epithelium with variable degree of inflammatory cell infiltration. No features of atypia were noted in the examined cases.

Radiographic findings

Radiographic findings for all the cases reported were found to be non-specific except for an ill-defined radiolucency in the denture-bearing areas.

DISCUSSION

The objective of this research was to study the prevalence of denture-induced lesions. Almost 80% of the cases reported in this study were males. This does not reflect the true percentage of male patients with dentures; it might be related to cultural reasons, as female patients prefer to be treated by female doctors.

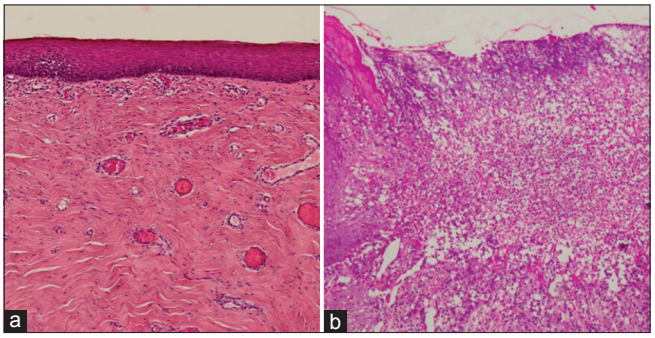

Figure 2: Photomicrograph showing (a) fibrous tissue covered by atrophic epithelium with absence of rete ridges (H and E ×20) and (b) non-specific ulceration (H and E, ×20)

A total of 43 cases (20.5%) were noted in this study among 210 prosthodontic patients who came to the College of Dentistry, University of Dammam. This is lower than what was reported in other studies where a prevalence of 40–52% oral mucosal lesions was noted among denture wearers.[4,13] However, another study done in Yemen recently did not show any association between the occurrence of oral mucosal lesions and the use of dentures.[37]

Regarding the prevalence of oral lesions and the type of dentures used, TUs were found to be more common among PDWs, while inflammatory fibrous hyperplasia was predominant among CDWs. RPL appeared only in patients with CDs fitted with suction devices. These differences were found to be statistically significant ($P = 0.004$). However, no such significant relation was found among denture wearers with regard to CAC. CAC could be related to the material used in denture construction and not to the type of denture used (partial or complete). A recent study confirmed the correlation between the occurrence of this disease and the adhesion of *Candida* on the acrylic resin.[38]

IFH ($n = 18$; 8.57%) was the most common lesion noted in association with the use of dentures in this study. Literature showed a variety of oral lesions that may arise with the use of dentures. The common lesions noted among them in order of frequency are denture stomatitis, angular cheilitis, denture irritation

hyperplasia, flabby ridges, TUs, allergic reactions to denture materials, acute infections, and oral carcinomas.[12]

In this study, 10 cases (4.8%) had been reported with TUs. However, its incidence was found to be lower among other institutionalized denture wearers (2–3%).[24] TUs usually develop within 1–2 days following insertion of new dentures, but may also be seen in old ill-fitting dentures, due to their overextended flanges, or unbalanced occlusion. These had been reported to occur more commonly during the first 5 years of denture use,[4,6] although oral mucosal lesions, in general, were found to be more common in patients with CDs.[39] This study also showed higher prevalence of oral lesions among patients with CDs; however, TUs, in particular, was more common in patients with PDs.

Denture stomatitis (denture sore mouth) refers to inflammatory changes in the oral mucosa of denture-bearing tissues. These changes are featured by erythema and are found beneath complete or partial dentures in both jaws, but are more commonly reported in the maxilla.[24] In a study of 463 randomly selected geriatric denture wearers, the prevalence of denture stomatitis was found to be as high as 65%.[25] However, this percentage decreased significantly in our study (3.33%; 7 out of 210 cases). This might be related to the proper patient education with regard to the maintenance of good oral hygiene.

Tissue hyperplasia of the oral mucosa in contact with the denture borders (inflammatory hyperplasia or epulis fissuratum) is a common tissue reaction to ill-fitting dentures. This lesion was reported in 5–10% of non-randomized groups of denture wearers.[24] In a larger study on the prevalence of oral mucosal lesions in different age groups, denture-induced hyperplasia was found in 6.3% among the subjects aged 55–64 and in 11.5% among the subjects aged above 65.[31] Similarly, it was found in 8.57%[18] of the total cases reported in this study. The lesions were found to be due to chronic injury by unstable dentures or by thin, overextended denture flanges.[32] After replacement or adjustment of the dentures, the inflammation and edema appeared to subside and provided evidence of clinical improvement.

RPL appeared clinically as atrophic mucosa in the mid-palatal area where the maxillary dentures used to have a small, rounded piece of rubber for retention. A total of 8 such cases (3.8%) were reported in this study. To our knowledge, no such lesions were found to be reported in the English literature. In this technique, rubber is used to obtain suction for maxillary denture retention and is placed in the palatal surface of these dentures. Such techniques are not accepted internationally as they may favor the development of squamous cell carcinoma.

CONCLUSION

In conclusion, the prevalence of denture-induced oral lesions was found to differ significantly from that reported in other studies. The diversity of these lesions among different studies depends on the type, quality and materials of dentures delivered, techniques used, and the methods of patients' instructions adopted. However, further studies are needed in this regard on a larger population for the results to be conclusive.

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Conflicts of interest

There are no conflicts of interest.

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