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Prevalence of denture induced oral mucosal lesions in removable denture wearers

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Abstract

Background: Dentures can cause pathological problems to the oral tissues known as denture-induced mucosal lesions; the most common type is denture stomatitis.

Objective: To estimate the frequency of denture-induced mucosal lesions among denture wearer patients attending oral diagnosis clinic /Faculty of Dentistry in Tishk International University.

Patients and Methods: A patient who uses either removable partial or complete dentures was included. The patient's gender and age, denture-related data, and oral lesions induced by dentures were evaluated. The data were statistically analyzed using chi-square and multivariate logistic regression.

Results: Oral lesions (23.5%) were more common in males; the lesions found include denture stomatitis, denture hyperplasia, traumatic ulcers, and angular cheilitis. Denture stomatitis was the most common type (7%). The correlation between vertical dimension state and oral lesions was very highly significant.

Conclusion: The major cause of denture-induced mucosal lesions was a change in denture vertical dimension and mostly a reduction in vertical dimension.

Keywords: Edentulous, dentures-induced mucosal lesions, Denture stomatitis.

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Introduction

Carpal tunnel complete edentulism is an oral cavity without any teeth. Adequate dentition is important for good quality of life of every person. The protective mechanism of the oral mucosa can be affected by edentulism which is described as the "final marker of disease burden for oral health [1]. Partial edentulism referred to loss of some teeth but not all of them and the cause may be trauma, dental caries, periodontal diseases, tooth impactions, neoplasm and cystic lesions [2,3]. Dentures may be the direct cause of oral tissue changes, regarding both pathogenesis, clinical and histopathological appearance, which resulting in oral lesions, these conditions occur , due to environmental changes of the oral cavity conditions and oral tissue resistance., systemic diseases also affect on oral condition and reduce oral mucosal resistance [4]. However oral mucosal lesions are also induced by ill-fitting denture, improper denture use, neglecting denture cleaning with plaque accumulation, and mechanical trauma [5].

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Denture-related oral mucosal lesions (DML) have been associated with bad oral hygiene, candida infection, poor retention and stability of dentures[6] .The defective dentures create food accumulation under the denture base and natural cleaning action by lips and the tongue will be limited, Patients often think that washing denture by water only is enough for cleaning it, however combination of mechanical cleaning, with some chemical materials, such as sodium hypochlorite, seems to be more appropriate [7]. Mucosal lesions can appear in the oral cavity due to denture using which causes changes in the state of the oral cavity, these lesions mostly seen in the mucosa because of direct contact of the denture with the mucosa [8].

Denture-induced stomatitis is asymptomatic mild inflammation of the mucosa, in some cases denture stomatitis is symptomatic causing a burning sensation, bleeding of mucosa, and dryness in the mouth [9]. These changes appear as redness of the mucosa beneath complete or partial dentures in both jaws, but are more common in the maxilla [10]. Epulis fissuratum is a benign fibrous connective tissue hyperplasia appears as result of chronic irritation produced by the flange of poorly adapted denture. The lesion is usually painless; its appearance as two excess tissue folds in alveolar vestibule buccal sulcus, with fitting of the denture flange between the two folds [11]. Traumatic ulcers (TU) appear as round or oval shape, and it is caused by over extension of denture borders, denture inner surface roughness or may be due to change of mucosal resistance to irritation [12]. Angular cheilitis appears as erythematous fissuring at angles of the mouth, saliva accumulation in commissure wrinkling area and continues moistening will lead to angular cheilitis. This is usually associated with decrease vertical dimension in denture wearer [11].

Patients and Methods

The study sample were consisting of (255) patients of both genders with age range from 17–82 attending the Faculty of Dentistry, Tishk International University, in the period between October / 2021 and December / 2022, all the patients were examined to detect the type of oral mucosal lesions. A patient who uses either removable partial or complete dentures was included. A provisional diagnosis was established at the time of examination. Data related to the patients was recorded; these data included the name, age, gender of the patients. Patient's oral examination was conducted with appropriate instruments under suitable lighting and dental chair. Oral lesions related to the dentures were recorded. The study was carried out with the approval of the Ethical Committee of Tishk International University and informed consent was obtained from all patients before the examination.

Statistical Analysis

The methods of descriptive statistics used were frequencies, percentages, mean value, and range.Results were tabulated and chi-square test was used for statistical analysis of the data. P value less than 0.05 was considered significant.

Results

The study sample comprised 255 patients, of which 164 (64.3%) were male and 91 (35.7%) were female. The ages of the patients were between 17 and 82 years, and the mean age was 56.5 years. Most of the

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patients were in the (61–70) year age group; smokers comprised 187 (73.3%) patients from the total number Table (1).

Table (1): Distribution of the samples according to gender, age classes and smoking habit

		Frequency	Percent
Gender	Male	164	64.3
	Female	91	35.7
	Total	255	100.0
Age Classes	≤ 40	22	8.6
	41 - 50	62	24.3
	51 - 60	71	27.8
	61 - 70	72	28.2
	≥ 71	28	11.0
	Total	255	100.0
Smoking	Yes	187	73.3
	No	68	26.7
	Total	255	100.0

According to level of education just 38 (14.9%) patients had high education level .most of the patients had primary school education (36.1%) and 23.1% of the patients were illiterate, from the total numbers; just 34 (13.3%) patients were night denture wearer Table (2).

Table (2): Distribution of the samples according to education and wearing denture at night

		Frequency	Percent
Education	Illiterate	59	23.1
	Read&write	7	2.7
	Primary schoo	92	36.1
	Intermediate	37	14.5
	Secondary	22	8.6
	College	38	14.9
	Total	255	100.0
Wearing Dentures at Night	Yes	34	13.3
	No	221	86.7
	Total	255	100.0

Our results show that among all types of dentures, only 19 (7.5%) patients from the total number had decreased vertical dimension, while 6 (2.4%) patients had increased vertical dimension, and according to the state of retention and stability of the dentures, 45 (17.6%) dentures had no retention and 44 (17.3%) dentures were non-stabile Table (3).

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Table (3): Distribution of the samples according to denture vertical dimensions, retention and stability

		Frequency	Percent
Vertical dimension	Good	230	90.2
	Decreased	19	7.5
	Increased	6	2.4
	Total	255	100.0
Retention of denture	Yes	210	82.4
	No	45	17.6
	Total	255	100.0
Stability	Yes	211	82.7
	No	44	17.3
	Total	255	100.0

Oral lesions were found in 60 (23.5%) patients only, males were more affected; denture stomatitis was the more common type. DML were more common in the age group (51–60), denture stomatitis was a more common type (78%) with a non-significant association of DML with patient gender and age group, the relation of DML with patient education was non-significant, and most oral lesions were seen among patients with low education. DML was mostly seen among patients with primary school education levels Table (4).

Table (4): Frequency of oral lesions according to patients gender, age classes and education

		Denture stomatitis	%	Ulcer	%	Denture hyperplasia	%	Angular chilitis	%	Total	P-Value	Decision
Gender	Male	14	78	12	67	6	50	11	92	43	0.128	NS
	Female	4	22	6	33	6	50	1	8	17		
Total		18	100	18	100	12	100	12	100	60		
Age classes	≤ 40	0	0	2	11	2	17	0	0	4	0.379	NS
	41 - 50	4	22	5	28	2	17	2	17	13		
	51 - 60	6	33	5	28	3	25	6	50	20		
	61 - 70	7	39	3	17	2	17	4	33	16		
	≥ 71	1	6	3	17	3	25	0	0	7		
Total		18	100	18	100	12	100	12	100	60		
Education	Illiterate	4	22	5	28	5	42	1	8	15	0.142	NS
	Read&write	1	6	1	6	0	0	1	8	3		
	Primary schoo	10	56	7	39	5	42	3	25	25		
	Intermediate	2	11	3	17	0	0	1	8	6		
	Secondary	0	0	1	6	0	0	4	33	5		
	College	1	6	1	6	2	17	2	17	6		
Total		18	100	18	100	12	100	12	100	60		

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The results showed a very significant association between the DML and the vertical dimension; 16 DML cases were related to decreased vertical dimension, while one DML case was due to increased vertical dimension of the denture; the association between DML and both denture retention and stability was non-significant Table (5).

Table (5): Frequency of oral lesions according to denture vertical dimensions, retention and stability

		Denture stomatitis	%	Ulcer	%	Denture hyperplasia	%	Angular chilitis	%	Total	P-Value	Decision
Vertical dimension	Good	16	89	16	89	11	92	0	0	43	0.000	VHS
	Decreased	2	11	1	6	1	8	12	100	16		
	Increased	0	0	1	6	0	0	0	0	1		
Total		18	100	18	100	12	100	12	100	60		
Retention of denture	Yes	14	78	9	50	5	42	10	83	38	0.058	NS
	No	4	22	9	50	7	58	2	17	22		
Total		18	100	18	100	12	100	12	100	60		
Stability	Yes	15	83	11	61	6	50	11	92	43	0.062	NS
	No	3	17	7	39	6	50	1	8	17		
Total		18	100	18	100	12	100	12	100	60		

The association of DML with night denture wearing was very highly significant; most of the patients didn't remove dentures at night, and most of them didn't use mouthwash. DML was mostly seen in those patients who used the same dentures for > 2 years. The association of DML with both denture usage duration and mouth wash usage was non-significant Table (6).

Table (6): Frequency of oral lesions according to night denture wearing, using mouth wash and denture using duration

		Denture stomatitis	%	Ulcer	%	Denture hyperplasia	%	Angular chilitis	%	Total	P-Value	Decision
Wearing dentures night	Yes	15	83	2	11	7	58	3	25	27	0.000	VHS
	No	3	17	16	89	5	42	9	75	33		
Total		18	100	18	100	12	100	12	100	60		
Mouth wash using	Yes	5	28	0	0	3	25	3	25	11	0.120	NS
	No	13	72	18	100	9	75	9	75	49		
Total		18	100	18	100	12	100	12	100	60		
Denture using duration /year	≤ 1	1	6	1	6	0	0	1	8	3	0.767	NS
	1 - 2	0	0	1	6	0	0	0	0	1		
	> 2	17	94	16	89	12	100	11	92	56		
Total		18	100	18	100	12	100	12	100	60		

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As shown in Table (7), most patients were not on medication, and 40 MDL cases were seen among these patients; the most common type was traumatic ulcer. For patients on medication, DML is mostly seen in diabetic patients. The relation of oral lesions to the medication taken by the patients was non-significant.

Table (7): Frequency of oral lesions in relation to medication

	Oral lesion								Total		
Medication	**Denture stomatiti**	**%**	**Ulce**	**%**	**Denture hyperplasia**	**%**	**Angula chilitis**	**%**		**P-Valu**	**Decisior**
no medication	9	50	13	72	9	75	9	75	40	0.461	NS
Anti-hypertension	1	6	1	6	2	17	0	0	4		
Diabetic medication	2	11	3	17	0	0	2	17	7		
Heart disease medicatic	3	17	1	6	0	0	0	0	4		
Aspirin	0	0	0	0	0	0	1	8	1		
Ameperazol	1	6	0	0	0	0	0	0	1		
Antihypertension & diab medication	1	6	0	0	1	8	0	0	2		
Antihypertension &hea diseasse medication	1	6	0	0	0	0	0	0	1		
Total	18	100	18	100	12	100	12	100	60		

DML was more associated with complete dentures, mostly seen in patients wearing acrylic upper and lower dentures; the association of DML with denture types was non-significant Table (8).

Table (8): Frequency of oral lesions in relation to type of denture

		Dentur stomatit	**%**	**Ulce**	**%**	**Denture hyperplas**	**%**	**Angular chilitis**	**%**	**Total**	**P-Value**	**Decisior**
Complete denture	None	8	44	11	61	8	67	7	58	34	0.761	NS
	Acrylic upper	2	11	0	0	1	8	0	0	3		
	Acrylic lower	1	6	1	6	0	0	0	0	2		
	Acrylic upper & lower	7	39	6	33	3	25	5	42	21		
Total		18	100	18	100	12	100	12	100	60		
Partial Denture	None	9	50	7	39	4	33	6	50	26	0.451	NS
	Acrylic lower	2	11	0	0	1	8	2	17	5		
	Acrylic upper	5	28	6	33	6	50	2	17	19		
	Chrome cobalt lower	1	6	1	6	1	8	0	0	3		
	Chrome cobalt upper	1	6	0	0	0	0	0	0	1		
	Acrylic upper&lower	0	0	4	22	0	0	2	17	6		
Total		18	100	18	100	12	100	12	100	60		

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This study results showed that patients cleaned their dentures at least once a week , most of them cleaned their dentures once a day ,non- significant association of DML with the frequency of denture cleaning and number of cigarette smoking /a day ,however 40 DML cases from total number were seen among nonsmokers Table (9).

Table (9): Distribution of oral lesions in relation to frequency of denture cleaning and smoking

		Denture stomatit	%	Ulce	%	Denture hyperplas	%	Angular chilitis	%	Total	P-Value	Decision
Frequency of Denture Cleaning	.14	0	0	1	6	0	0	0	0	1	0.322	NS
	.28	1	6	0	0	0	0	1	8	2		
	1.00	10	56	5	28	5	42	3	25	23		
	2.00	4	22	7	39	6	50	5	42	22		
	3.00	3	17	5	28	1	8	3	25	12		
Total		18	100	18	100	12	100	12	100	60		
Number of cigarette/a day	0	11	61	12	67	9	75	8	67	40	0.357	NS
	2	0	0	0	0	1	8	0	0	1		
	5	0	0	0	0	1	8	0	0	1		
	10	3	17	2	11	0	0	1	8	6		
	12	0	0	2	11	0	0	0	0	2		
	14	1	6	0	0	0	0	0	0	1		
	15	0	0	1	6	0	0	2	17	3		
	20	2	11	0	0	1	8	1	8	4		
	30	1	6	0	0	0	0	0	0	1		
	40	0	0	1	6	0	0	0	0	1		
Total		18	100	18	100	12	100	12	100	60		

Figure (1): Clinical picture showing angular chilitis at the corner of the mouth and erythematous lesion on the palatal area under complete upper denture for a male patient

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Figure (2): Clinical picture showing Denture hyperplasia of the maxillary mucosa under complete denture for a female patient

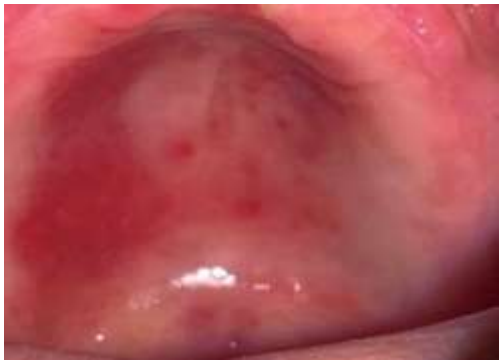

Figure (3): Clinical picture showing erythematous lesion on the palatal area under complete upper denture for a male patient

Discussion

Oral mucosal lesions commonly develop in denture wearers and usually appear as abnormal changes in mucosal color, texture, or as ulceration, erythema and hyperplasia. The sample used in this study consisted of 255 cases. 164 (64.3%) male and 91 (35.7 %) female patients and this is disagreed with studies by Tunde and Olalekan [13] and Arigbede and Taiwo [14] which showed females were more than males ,while our findings are consistent with Junketing study [15] in which most of the patients were male .In the present study mean age was (56.56), it was close to Curtis [16] study in which mean age was 55 years , while in Hassan [17] study mean age was 35.5 years .In this study oral lesion relation with age was non-significant which is in agreement with Martori, [18] study . da Silva HF [19] reported that oral lesions were seen more in women, and these come in disagreement with our study in which oral lesions were more in male since 64% of our sample were male and this possibly related to smoking which mostly seen among male. Also, oral lesions are more frequent among low educated patients, and this come in agreement with [20] study, the cause may be related to poor maintenance of good oral hygiene, and ignore dentures cleaning.

This result showed that oral lesions found in 60 (23.5%) patients, while DML prevalence was (4.3%) in Herald J Sherlin et al, (21) study, 59.5% in Gaur,[22] study ,45.6% in Pavicic, [23] study, and (39.5%) in [20] study. This study result is close to

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Mubarak, [24].in which DML prevalence was 20.5%. These results variation may be due to several factors such as sample size, demographics, methodology, and diagnostic criteria.

In agreement with [20] the present study results showed that oral lesions are more frequent in complete denture wearers in comparing with partial denture wearers, and this related to that complete denture cover more mucosal area which will be subjected to more denture effect. In our study just 34 (13.3) patients are night denture wearer with very highly significant association with DML while in Tunde and Olalekan study [13], the relationship between removing the denture from mouth at night and the development of DML was non-significant and the highest (35.7%) incidence of DML were among patients remove their denture at night. Yalcinkaya, [25] noted that wearing prosthesis at nights, are more important than cleaning of the denture in lesion formation. Wearing dentures overnight can affect saliva flow due to blockage of saliva's path; this can result in plaque accumulation under the base of the denture allowing the growth of candida which can result in denture stomatitis lesions. In our study denture stomatitis was the most common DML with prevalence (7%; 18 out of 255cases), while in Mubarak, (24) study the prevalence was (3.33%; 7 out of 210 cases). Budtz-Jörgensen [26] study reported that the prevalence of denture stomatitis was 65%. This might be related to continuous denture wearing even at night with bad oral hygiene or ill-fitting prosthesis.

In agreement with da Silva HF,[19] study, in this study angular cheilitis was less common DML (4.7%; 12 out of 255cases), it was associated with reduced vertical dimension .Traumatic ulcer prevalence was (7%; 18 out of 255 cases)in this study while in Tunde and Olalekan study [13] it was (78.6%) , in Mubarak, et al (24) study the prevalence was (4.8%).

TUs usually develop due to several etiological factors which include, denture poor adaptation, over extended flanges, or unbalanced occlusion .In our result the association between DML and poor denture retention and stability was non-significant. Regarding the medical history, in the present study, hypertension (12.5%) was the most common systemic illness followed by diabetes mellitus (10.2%), while in Herald J Sherlin, [21] and other studies [24,27] diabetes mellitus was the most common systemic illness followed by hypertension, however it was observed that there was no statistically significant relation between medication and DML. This study showed that DML were more common among smokers, other study (28) reported that smokers had a 3.6-time higher likelihood for developing DML than non- smoker, since smoking reduced salivary flow rate resulting in decreased saliva pH which may induced an acidic environment allowing Candida colonization. Furthermore, smoking also causes a decrease in salivary immunoglobulin A (IgA) resulting in an increased in oral Candida colonization (29).

Gökhan Özkan, [30] reported that DML were more common in dentures wearer who used water only for denture cleaning, compared with those who used mechanical and chemical cleaning methods. In this study there was non-significant association of DML with both mouth wash usage, and frequency

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of dentures cleaning. Some authors have reported that using ordinary teeth brushing method is an ineffective method of denture disinfection and it is better to use a chemical denture cleaner which allow a protective coating for dentures as a final cleaning step [31]. Mucosal lesions induced by removable dentures are influenced by several factors, such as oral hygiene, denture adaptation conditions, denture using and cleaning.

Conclusions

The prevalence of denture-induced oral lesions was found to differ 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 .The interpretation of our results shows the multifactorial nature of DML; among these are poor denture hygiene and fitness. To reduce the risk of developing DML, good quality prostheses and proper instruction for good oral and denture hygiene must be performed.

Recommendations

There should be a protocol with a written statement to ensure that patients are provided with all necessary information about wearing dentures, maintaining good hygiene, and the importance of regular check-ups.However, further studies are needed in this regard on a larger population for the results to be conclusive.

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Ethical clearance: This study was conducted according to the approval of College of Medicine/ University of Diyala and in accordance with the ethical guidelines of the Declaration of ethical committee of the College (document no.2023LMF767).

Conflict of interest: Nil

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انتشار آفات الغشاء المخاطي للفم الناجمة لدى مرتدي طقم الأسنان القابل للإزالة

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الملخص

خلفية الدراسة: من الممكن ان تسبب اطقم الاسنان مشاكل مرضية لأنسجة الفم والتي تسمى الآفات المتعلقة بأطقم الاسنان واهمها التهاب الفم بسبب الطقم.

اهداف الدراسة: لتقييم انتشار آفات الغشاء المخاطي للفم الناجم عن أطقم الأسنان لمراجعي عيادة الفحص /كلية طب الأسنان في جامعة تيشك الدولية .

المرضى والطرائق: تم تضمين المريض الذي يستخدم أطقم أسنان جزئية أو كاملة قابلة للإزالة تم تقييم البيانات المتعلقة بالجنس وعمر المريض، والبيانات المتعلقة بأطقم الأسنان ، ووجود آفات الغشاء المخاطي للفم. تضمن التحليل الإحصائي تطبيق الانحدار اللوجستي لمربع كاي ومتعدد المتغيرات.

النتائج: كانت الآفات الفمية أكثر شيوعًا بين الذكور (٢٣.٥٪) والتي تضمنت التهاب الفم وفرط التكون النسيجي بسبب طقم الاسنان، التقرحات الفمية بسبب الجروح والتهاب زوايا الشفاه . ان التهاب الفم بسبب طقم الاسنان كان الأكثر شيوعا (٧٪) وكانت العلاقة بين البعد الشاقولي لطقم الاسنان وآفات الفم ذات مغزى عال جدًا.

الاستنتاجات: السبب الرئيسي لآفات الغشاء المخاطي للفم المتعلقة بأطقم الأسنان هو تغير البعد العمودي للأطقم.

الكلمات المفتاحية: انعدام الأسنان، الآفات التي يسببها أطقم الأسنان، التهاب الفم بسبب طقم الاسنان

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