

## ORIGINAL ARTICLE

# Intra-oral Mucosal Conditions In A Group of Edentulous Patients

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## Abstract

**Objectives:** To obtain baseline information on Oral Mucosal Conditions (OMCs) in a sample of patients who are edentulous.

**Materials and methods:** Edentulous patients attending a university hospital were examined for the presence of OMCs, and demographic data were recorded. Statistical analysis was carried out on SPSS software; the following statistical tests were utilized: descriptive statistics, and The Mann Whitney U test.

**Results:** A total of one hundred and sixty-one participants were examined (34 females and 127 males with a mean age of 59 years). Sublingual varices were the most common OMC (54.7%) followed by hairy tongue (48.4%), fissured tongue (44.7%), leukodema (41.6%), Fordyce's Granules (30.4%), Smoker palate (23.6%), Frictional Keratosis (14.9%) and Geographic Tongue (3.64%). Among denture wearers denture stomatitis (6.2%) was the most common, followed by denture Fissuratum (3.7%) and angular cheilitis (3.7%). Smoking was associated with higher prevalence of OMCs, particularly hairy tongue, frictional keratosis, smokers' palate, and leukoedema. Denture wearers had more denture stomatitis and denture induced hyperplasia, and less frictional keratosis than non-denture wearers.

**Conclusion:** Mucosal changes in edentulous patients are affected by smoking, medical conditions, and superimposed by wearing complete dentures.

**Keywords:** mucosal lesions, oral lesions, edentulous, denture wearers, older patients.

## INTRODUCTION

Oral mucosal lesions or conditions are any normal or pathological mucosal changes that affect the oral mucosa. Some (OMCs) can decrease oral health-related quality of life and some of these lesions have the potential to become malignant and life threatening (1).

In addition, OMCs can interfere with daily activities through impacts on mastication, swallowing, and speech causing irritation and pain (2). These oral conditions may appear with increased age (3) where older patients are also vulnerable to non-transmissible chronic diseases, many of which share

common risk factors with different oral diseases (4). In addition to that, aging may be complicated by partial or complete tooth loss, the use of removable denture, drug-induced xerostomia, the occurrence of potentially malignant conditions, the presence of systemic diseases, and the use of medications, all of which may compromise the oral health (4, 5). More exposure to tobacco products in old age, dietary deficiency and stress were other factors for the appearance of mucosal abnormalities (6).

Edentulous patients may be using or intend to use complete dentures, which require optimum health of the oral mucosa. The prevalence of OMCs in the general population varies significantly between different countries from 4.9% to 64.7% (2). Different studies on OMCs used various experimental methods, diagnostic criteria and study samples including children (7) and dentate patients (2, 8).

An evaluation of the literature suggests that the prevalence of OMCs increases with age (9). Prevalence studies focused on denture-related OMCs as in Brazil (10) and Turkey (11). In the Arab region, OMCs were studied in the elderly population in Yemen (4) and Saudi Arabia (12) regardless of the status of their dentition. The current available information in the literature underestimates the oral health of edentulous population per se. Therefore the aim of this study is to obtain baseline information on the prevalence of intra oral mucosal conditions in a population of edentulous patients visiting the dental department at XXX University Hospital.

## **MATERIALS AND METHODS:**

This study was conducted in full accordance with the World Medical Declaration of Helsinki and conformed to STROBE Statement for observational

studies. Ethical approval was granted from the research committee at Jordan University Hospital where this research was conducted (approval number: 10/2021/20527) and informed consent to participate and publish was obtained from participants. Sample size calculation was performed using a computer software (G\*Power, version 3.1.9.7; Heinrich-Heine University). Inclusion criteria included being a completely edentulous patient. Exclusion criteria included failure to sign the consent to participate. A convenient sample of one hundred and sixty one edentulous patients who attended the undergraduate, postgraduate and specialty clinics at the removable prosthodontic department at Jordan University Hospital (from January to June 2021) were recruited for this study. The patients were interviewed by one trained dentist whereby demographic information was collected about the patients with emphasis on the medical history and medications taken by the patient, and smoking (amount and duration). The interview included questions on past experience with complete denture (i.e. presence of dentures, sleeping with the denture, satisfaction with the denture, and about the number of previous dentures if applicable).

Thorough intraoral examination was then carried out by the same dentist. The areas which were examined are: the tongue, the cheeks, the floor of the mouth, and the palate according to the protocol by Mathew et al. 2008 (13). Thorough examination of complete dentures for denture wearers was not attempted. Oral lesions and conditions were evaluated according to the WHO Guide to Epidemiology and Diagnosis of Oral Mucosal Diseases and Conditions (14). Suspicious lesions were biopsied and

inspected by a specialist in oral medicine.

Statistical analysis:

The SPSS computer software (IBM SPSS Statistics v19.0; IBM Corp., USA) was utilized for the statistical analysis of the collected data in this investigation. Descriptive statistics were carried out to summarize different study variables and Kolmogorov-Smirnov test was used to test normal data distribution.

The Mann Whitney U test was utilized to identify differences in presence of oral lesions between genders, between smokers and non-smokers, between participants with systemic conditions and without systemic conditions, and between participants with dentures and without dentures. The significance of the conducted statistical results was considered at two tailed  $\alpha$  of 0.05 and 95% confidence intervals.

## RESULTS

One hundred and sixty one patients participated in the study. The sample consisted of 34 females (21.1%) and 127 males (78.8%) (mean age=  $59.08 \pm 9.04$  years old). 40.4% of the participants were denture wearers and 59.6% were not using any denture.

Figure (1) presents the percentages of

smoking, medical conditions, presence of dentures, and Figure (2) presents the percentages of oral lesions among males and females in the study group. The distribution of the most common OMCs in the study sample was; sublingual varices (54.7%), hairy tongue (48.4%), fissured tongue (44.7%), leukodema (41.6%), Fordyce's Granules (30.4%), Smoker palate (23.6%), Frictional Keratosis (14.9%) and Geographic Tongue (3.4%). For denture wearers denture stomatitis (6.2%) was the most common, followed by denture Fissuratum (3.7%) and angular cheilitis (3.7%). The median quantity of cigarettes smoked by the participants was 20 cigarettes for a median duration of 35 years.

Table (1) presents the relationship between smoking and the presence of oral lesions among the study population. Smoking was associated with more hairy tongue, frictional keratosis, smokers' palate, and leukoedema than non-smokers ( $P < .05$ ). Participants with dentures were associated with denture stomatitis and denture fissuratum, and had less frictional keratosis than participants without dentures ( $P < .05$ ). In addition, females had less Fordyce's granules, frictional keratosis, smoker palate, and leukoedema than males ( $P < .05$ ).

**Table 1: Differences between subgroups among the study population (N= 161) according to Mann Whitney U test.**

| Oral lesions         | Smoking vs non-smoking | Dentures vs no dentures | Females vs males |
|----------------------|------------------------|-------------------------|------------------|
|                      | P                      | P                       | P                |
| Hairy Tongue         | .000*                  | .079                    | .181             |
| Fordyce's Granules   | .507                   | .940                    | .008*            |
| Frictional Keratosis | .009*                  | .035                    | .028*            |
| Smoker Palate        | .000*                  | .102                    | .006*            |
| Leukoedema           | .000*                  | .188                    | .000*            |

P= Two-tailed probability value. \* Significant value.

Regarding the medical condition, the patients with cardiac disease presented with geographic tongue more frequently than patients with no medical conditions ( $P < .05$ ). On the other hand, geographic tongue was more frequent in patients who take anti-hypertensives or anticoagulants ( $P < .05$ ).

## DISCUSSION

This study aimed to obtain baseline information on the state of health of the oral mucosa of edentulous patients visiting Jordan University Hospital. This study is unique because the focus is edentulous patients per se rather than the effects of dentures on oral mucosa (15, 16). The oral mucosa supports and retains complete dentures therefore knowledge of the lesions that present in edentulous patients is of paramount importance in providing optimum professional care. In addition, some physiological changes of the normal anatomy can easily be misdiagnosed for pathological conditions (17). Scarce information is available in the literature regarding the mucosa of completely edentulous mouths.

Furthermore, this study investigated possible relationships of some mucosal conditions to medical conditions, smoking, and edentulism. Studies in the literature reported the prevalence of mucosal lesions among elderly patients presented to dental schools (6), denture wearers (18), children (19), and among all dental patients attending teaching dental schools (20).

The current study showed that sublingual varices were the most common OMC, this finding is in accordance with Shet et al. 2013 (21). The second most common lesion in the current study was hairy tongue followed by fissured tongue; however geographic tongue was less common. This is consistent with previous studies on Jordanians where

fissured tongue was the most common tongue lesion, followed by coated tongue, geographic tongue and hairy tongue (22, 23). Fissured tongue was also the most common tongue lesion in Malaya, followed by geographic tongue (24). Other OMCs such as leukoedema, Fordyce's granules, smoker's palate and frictional Keratosis were common in this study which is comparable to Mathew et al. 2008 in India where Fordyce's condition followed by frictional keratosis, fissured tongue, leukoedema and smoker's palate were reported (13).

In this study smoking was associated with hairy tongue, frictional keratosis, smokers' palate, and leukoedema. It is documented that smoking combined with poor oral hygiene are possible etiological factors for hairy tongue due to deposition of nicotinic derivatives and excessive keratin production on the filiform papillae of the dorsal surface of the tongue (25). A strong correlation was found between hairy tongue and smoking in another study in Jordan (22) which supports our results. The association between frictional keratosis and smoking here may be linked to the chemical trauma of oral tissues from smoking. Leukoedema was frequent among the study population (40.6%) similar to Saudi (8). Leukoedema is more prevalent in smokers and increases with age (13). A study in Saudi Arabia reported a high prevalence rate of hairy tongue, smoker's melanosis, stomatitis nicotina or smoker's palate, frictional keratosis, fissured tongue, and leukoedema in tobacco users (26) which are in accordance with the OMCs seen in this study especially that both populations share the same ethnic origin.

Among denture wearers; denture stomatitis (6.2%) was the most common followed by denture fissuratum (3.7%) and angular cheilitis (3.7%), whereas frictional

keratosis was less commonly seen in denture wearers compared to non-wearers which is consistent with other studies (27). In contrast to the results regarding less frictional keratosis in denture wearers in our sample, the latter and fibrous hyperplasia were common in complete denture wearers in other studies (28).

Females had less Fordyce's granules, frictional keratosis, smoker's palate, and leukoedema than males. These results must be interpreted carefully due to fewer females participating in this study. An association between Fordyce's granules and non-polyposic colorectal carcinoma (Lynch syndrome) was reported without association with age or gender, therefore careful examination of Fordyce's granules, especially located in the lower gingival and vestibular mucosa, may identify families at risk of this carcinoma syndrome (17). Leukoedema affected males more than females (29).

There was a statistically significant association between geographic tongue and history of cardiac disease. The reason for this association is not known, but it might be prudent to assume that the association between the two conditions is due to the high prevalence. Geographic tongue is a common mucosal condition among general population and cardiac diseases are prevalent among older patients. Therefore both conditions might be associated. Mucosal lesions were observed in most of the elderly with diabetes mellitus but no significant relationship was observed in a Turkish population (30). The current results demonstrated that taking anti-hypertensives and anti-coagulants was associated with geographic tongue. Diabetes, psoriasis, and hormonal changes were possibly seen with geographic tongue (17). Geographic tongue and fissured tongue were

detected in 6.8% and 11.4% respectively of 1041 Jordanian dental outpatients examined, and both conditions were observed in 2.9% of the subjects (22). Moreover, fissured tongue was the most common tongue lesion diagnosed in 11.5% of the subjects, followed by coated tongue (8.2%) and geographic tongue (4.8%) in a recent study in Jordan (23). However, both studies did not link tongue conditions to the medical status of the subjects.

To sum up, this study found that the edentulous patients attending XXX University Hospital are in a good state of oral mucosal health. Some of the results in the current study were difficult to interpret due to scarcity of information in the literature such as the relation between systemic diseases and tongue conditions.

Limitations of this study include the limited sample size which was a convenient sample of dental school patients. However, the power calculation and significance levels were performed. Cross-sectional studies provide descriptive information about the study sample which may not be representative of the general population. In addition, medical conditions and medications were recorded using a self-structured questionnaire. Another limitation of the current study was that professional examination of dentures, the fit of dentures, amount of bacteria and candida on the fitting surface, oral hygiene practices and salivary flow with their effect on the oral mucosal health was not performed. This might be considered an opportunity for further research. Statistical analysis of the results by gender, medical history and the use of complete dentures was difficult due to the small study sample.

After conducting this research, we advise to conduct follow-up examinations on patients without lesions but with risk factors that may

increase the likelihood of developing intraoral lesions. This will help establish a temporal relationship between the occurrence of the lesion and the identified risk factors.

## CONCLUSIONS

Intra-oral mucosal changes are affected by smoking, medical conditions, and medications and superimposed by wearing complete dentures. Some physiological, para-physiological, or pathological changes of the normal anatomy cannot be easily diagnosed. Knowledge of the common

mucosal lesions that present in edentulous patients will help in diagnosis of physiological, para-physiological, or pathological changes of normal mucosa.

## FUNDING

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## CONFLICT OF INTERESTS

The authors declare no conflict of interests.

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## حالات الاغشية المخاطية داخل الفم عند فاقدى كامل الاسنان

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### الملخص

**الأهداف:** الحصول على معلومات أساسية حول الحالات المخاطية الفموية في عينة من المرضى الذين فقدوا أسنانهم.

**المواد والطرق:** تم فحص المرضى الذين فقدوا أسنانهم والذين حضروا الى مستشفى الجامعة للكشف عن وجود الحالات المخاطية الفموية، وتم تسجيل البيانات الديموغرافية. تم إجراء التحليل الإحصائي باستخدام برنامج SPSS ؛ تم استخدام الاختبارات الإحصائية التالية: الإحصاءات الوصفية، واختبار مان ويتي. U

**النتائج:** تم فحص مجموع 161 مشاركاً (34 إناث و 127 ذكور بمتوسط عمر 59 سنة). كانت الشقوق تحت اللسان هي الحالة المخاطية الفموية الأكثر شيوعاً (54.7%) تليها اللسان الشعري (48.4%)، اللسان المشقوق (44.7%)، اللوكوديميا (41.6%)، حبيبات فورديس (30.4%)، قمة المدخنين (23.6%)، النمش الاحتكاكي (14.9%)، واللسان الجغرافي (3.64%). بين مرتدي الأسنان الاصطناعية كانت الاستوما الاصطناعية هي الأكثر شيوعاً (6.2%)، تليها الشقوق الناتجة عن الأسنان الاصطناعية (3.7%) والقرحة الزاوية (3.7%). كان التدخين مرتبطاً بزيادة انتشار الحالات المخاطية الفموية، بشكل خاص اللسان الشعري، النمش الاحتكاكي، قمة المدخنين، واللوكوديميا. كان لدى مرتدي الأسنان الاصطناعية المزيد من الاستوما الاصطناعية وتضخم الأنسجة الناتج عن الأسنان الاصطناعية، وأقل نمش احتكاكي من غير مرتدي الأسنان الاصطناعية.

**الاستنتاج:** تتأثر التغيرات المخاطية في المرضى الذين فقدوا أسنانهم بالتدخين والحالات الطبية، بالإضافة الى ارتداء الأسنان الاصطناعية الكاملة.

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**الكلمات الدالة:** التغيرات المخاطية، الحالات الفموية، فاقدى الأسنان، مرتدي الأسنان الاصطناعية،

المرضى كبار السن