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RESEARCH ARTICLE

# Oral Potentially Malignant Disorders among Dental Patients: a Pilot Study in Jordan

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## Abstract

**Background: To determine the prevalence, types, and risk factors of oral potentially malignant disorders (OPMDs) among a group of Arab Jordanian dental patients, and to evaluate their awareness and attitudes toward early diagnosis and treatment. Materials and Methods: A total of 1,041 patients attending a University Hospital for dental care were examined for the presence of OPMDs. Histopathological examination was performed on all cases clinically diagnosed and patients were directly interviewed to evaluate their knowledge and attitudes toward early detection and treatment of oral cancer. Results: The prevalence of OPMDs overall was 2.8%. Lichen planus/lichenoid lesions were the most common lesions (1.8%) followed by leukoplakias (0.48%), chronic hyperplastic candidiosis (0.38%), and erythroplakia (0.096%). Smoking, alcohol, and age (>40 years) were the main identifiable risk factors. Patients with OPMDs displayed a general lack of awareness and negative attitudes towards early diagnosis and treatment. Conclusions: OPMDs among Arab dental patients are relatively uncommon and awareness about oral cancer among Jordanian dental patients is low. Interventions to improve public knowledge about oral cancer and attitudes toward early diagnosis and treatment are urgently indicated.**

**Keywords:** Oral - potentially malignant - cancer - Arab - Jordan - early detection, precancer

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## Introduction

Oral (mouth) cancer is a significant health problem. Worldwide, it is the sixth most common cause of cancer related deaths (Jemal et al., 2010). The known aetiology of oral cancer is primarily linked to modifiable risk factors - tobacco use, alcohol consumption, betel use, and combinations of these habits (Petti et al., 2012). Human Papilloma Virus (HPV) infection is implicated mainly in oropharyngeal cancer, and ultraviolet light is the main factor in lip cancer (Hobbs et al., 2006). Socioeconomic status is influential in oral cancer (Moles et al., 2008). Many other factors are possibly implicated in mouth, lip and oropharyngeal cancers, including immunosuppression (van Leeuwen et al., 2009), familial and genetic factors (Turati et al., 2013), diet (Garavello et al., 2009), marijuana use (Marks et al., 2014), and even exercise (Nicolotti et al., 2011).

More than 90% of oral cancers are squamous cell carcinomas (SCC) (Scully & Bagan, 2009). Unfortunately, the natural history of oral SCC is not fully understood (Napier and Speight, 2008; Scully & Bagan 2009), but current knowledge suggests that oral SCC develops in a stepwise process characterised by the initial presence of precursor cells and possibly lesions that subsequently develop into cancer (Reibel, 2003; Braakhuis et al., 2004; Angadi et al., 2012). Several studies have shown that many oral SCCs are preceded by identifiable precursor lesions or conditions (Gupta et al., 1998; Schepman et al., 1999; Warnakulasuriya et al., 2007). The term "oral potentially malignant disorders" (OPMD) was adopted by the World Health Organisation (WHO) in 2005 to describe oral lesions and conditions associated with a risk of malignant transformation (van der Waal, 2009). Leukoplakia, erythroplakia, and lichenoid lesions are the most important OPMDs (Scully and Bagan, 2009) but several other oral lesions and conditions may also be associated with an increased risk of oral SCC (Scully and Bagan, 2009; van der Waal, 2014).

The risk of malignant transformation varies greatly depending on the exact type of OPMD, site within the mouth and the populations studied (Reibel, 2003; Warnakulasuriya et al., 2011). Currently, there are no reliable clinicopathological or molecular predicting factors for malignant transformation that can be used in an individual patient (van der Waal, 2014; Scully, 2014). Early detection and treatment and identification of at risk patients remains the most important approach for reducing the risk of malignant transformation associated with OPMDs.

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There appear to be significant geographic variations in the prevalence of OPMDs with overall higher prevalences in Asia than in the West. Higher prevalences have been reported from South East Asian and Pacific countries, e.g. Srilanka 11.3% (Amarasinghe et al., 2008), Taiwan 12.7% (Chung et al., 2005), Papua New Guinea 11.7% (Thomas et al., 2008), and India 29.8% (Mehrotral et al., 2008). Studies from western countries generally report much lower prevalences, e.g. USA 0.5% (Scheifele et al., 2003), Germany 1.6% (Reichart et al., 2000), Hungary 1.3% (Banoczy et al., 1991), Spain 1.6% (Garcia Pola-Vellejo et al., 2002), Sweden 3.6% (Axell et al., 1987), and the Netherlands 0.6% (Schepman et al., 1996). This wide geographical variation across countries could be attributed to differences in socio-demographic characteristics, types and patterns of risk habits, and clinical definitions of disease (Johnson et al., 2011).

Interestingly, there are very limited data about oral cancer and OPMDs among Arab patients (Zini et al., 2012; Krishna Rao et al., 2013; Ismail et al., 2013; Al-attas et al., 2014). The aims of this study therefore, were to determine the prevalence, types, and risk factors of OPMDs among a group of Arab dental patients, and to evaluate the awareness and attitudes of patients diagnosed with OPMD toward early diagnosis and treatment. Results obtained from this study are aimed to assist the implementation of an effective health education programme to enhance early detection of oral cancer.

## Materials and Methods

The Faculty of Dentistry Research and Ethics Committee (FDREC) at the University of Jordan, Amman reviewed and approved the study which was conducted during a 1 year period (from April 2013 to April 2014). The research was conducted in full accordance with the World Medical Association Declaration of Helsinki.

New patients attending the screening dental clinic at The University of Jordan Hospital were examined for the presence of OPMDs by a single Oral Medicine specialist (YH) according to the method proposed by the World Health Organisation (Kramer et al., 1980), and diagnostic biopsies were obtained under local analgesia when mucosal lesions were identified. Consent was obtained from all patients prior to biopsy.

Clinical diagnoses were based on criteria defined by Axell et al., 1984 adopted by the WHO workshop held in London in 2005. Histopathological examination of tissue specimens was performed blind by a trained oral pathologist (FS) to ascertain clinical diagnoses and to evaluate the existence and severity of epithelial dysplasia. Data about habits such as smoking, narghile (shisha) use, alcohol drinking, qat, shamma, betel nut use, tobacco chewing, or recreational drug use was obtained from all patients. In addition, patients diagnosed with OPMDs were directly interviewed and asked specific questions to evaluate their level of awareness and attitudes toward the early diagnosis of oral cancer. Patients with OPMDs were informed about their condition, advised to avoid modifiable risk factors, and scheduled for treatment and follow up appointments.

Statistical analysis was performed using SPSS for Windows release 16.0 (SPSS Inc., Chicago, IL, USA). Frequency distributions were obtained and chi-square and Fisher's Exact tests were used to compare differences between groups. Statistical significance was set at $p<0.05$.

## Results

*Demographic characteristics and risk habits*

A total of 1041 patients (657 females and 384 males) were examined. The mean age of study patients was 37.6 years ±16.5 (range: 16-86 years). Out of the total group investigated, 32.6% were smokers (15.2% cigarettes, 11.6% narghile, 5.8% both), 6.6% reported alcohol drinking, and 0.8% chewed qat (khat). None of the patients reported the use of smokeless tobacco, betel nut chewing, or recreational drug use (Table 1).

*Prevalence, types, and risk factors of OPMDs*

Out of the total group examined, 29(2.8%) patients (14 males and 15 females) were clinically diagnosed with OPMDs. The mean age of such affected patients was 45.5 years±11.8 (range: 20-81 years). About half of these patients (48.3%) smoked tobacco and 17.2% reported alcohol drinking.

Of the 29 cases with OPMDs, 10 (0.96%) were lichenoid lesions, 9 (0.86%) were lichen planus, 5(0.48%) were leukoplakia, 4 (0.38%) were chronic hyperplastic candidiosis, and 1 (0.096%) case was erythroplakia. Only two patients (one with reticular lichen planus and one with erosive lichen planus) reported symptoms (burning sensation) related to the lesions (Table 2).

Patients with OPMDs were significantly older (P=0.008) and showed higher prevalence of alcohol consumption (P=0.04). Smoking consumption was more prevalent among patients with OPMDs, and the difference was very close to statistical significance (P=0.07) (Table 3).

*Histopathological findings*

Incisional biopsies were obtained from all patients with clinically diagnosed OPMDs. Of the 19 cases clinically diagnosed as lichen planus/lichenoid lesions, only one

**Table 1. Demographic Characteristics and Risk Habits among Study Group**

| | | Number | (%) |
|---|---|---|---|
| Gender | Male | 657 | 63 |
| | Female | 384 | 37 |
| Age | <40 | 595 | 57.3 |
| | 40-60 | 317 | 30.4 |
| | >60 | 129 | 12.3 |
| Tobacco | 339 | 32.6 | |
| | Cigarettes | 158 | 15.2 |
| | Narghile | 121 | 11.6 |
| | Both | 60 | 5.8 |
| | Alcohol | 69 | 6.6 |
| Chewing | Qat | 8 | 0.8 |
| | Betel nut | 0 | 0 |
| | Smokeless tobacco | 0 | 0 |
| Recreational drugs | | 0 | 0 |

**Table 2. Sample Characteristics of the 29 Patients Diagnosed with OPMDs**

| | | Number | (%) |
|---|---|---|---|
| Gender | Male | 14 | 48.2 |
| | Female | 15 | 51.8 |
| Age | <40 | 8 | 27.5 |
| | >40 | 21 | 72.5 |
| Risk habits | Tobacco smoking | 14 | 48.2 |
| | Alcohol | 5 | 17.2 |
| | Chewing | | |
| | Qat | 0 | 0 |
| | Betel nut | 0 | 0 |
| | Smokeless tobacco | 0 | 0 |
| | Recreational drugs | 0 | 0 |
| Anatomic site of OPMD | Buccal mucosa | 19 | 65.5 |
| | Tongue | 6 | 20.7 |
| | Labial mucosa | 3 | 10.4 |
| | Floor of the mouth | 1 | 3.4 |
| Clinical diagnoses | Lichenoid lesions | 10 | 34.5 |
| | Lichen planus | 9 | 31.1 |
| | Leukoplakia | 5 | 17.3 |
| | Chronic hyperplastic candidiosis | 4 | 13.5 |
| | Erythroplakia | 1 | 3.5 |

**Table 3. Risk Factors Associated with the Diagnosis of OPMDs**

| Variable | | Patients with PMDs N (%) | Patients with no PMDs N (%) | P value |
|---|---|---|---|---|
| Age | >40 years | 19 (65.5) | 414 (40.9) | 0.008* |
| | ≤40 years | 10 (34.5) | 597 (59.1) | |
| Gender | Male | 14 (48.3) | 369 (36.5) | 0.20* |
| | Female | 15 (51.7) | 642 (63.5) | |
| Smoking | Yes | 14 (48.3) | 326 (32.2) | 0.07* |
| | No | 15 (51.7) | 685 (67.8) | |
| Alcohol use | Yes | 5 (17.2) | 69 (6.8) | 0.04** |
| | No | 24 (82.8) | 942 (93.2) | |

*P value of Chi square test; **P value of Fisher's Exact Test

case showed histopathological evidence of dysplasia (mild). Basal layer hyperplasia, hyperparakeratosis, absence of dysplasia, and epithelial atrophy were the main histopathological findings in cases clinically diagnosed as leukoplakia. None of the four cases diagnosed clinically as chronic hyperplastic candidiosis showed evidence of dysplasia. One case was diagnosed clinically as erythroplakia, and histopathological examination showed a poorly differentiated squamous cell carcinoma.

*Attitudes of OPMDs patients toward early diagnosis and treatment of oral cancer or OPMDs*

Almost all patients (96.5%) with OPMDs were unaware of the existence of a lesion. Only two patients (6.9%) had been informed previously that they had oral mucosal lesions during their earlier visits to general dentists. Only 13.8% of patients diagnosed with OPMDs reported that they visit dentist regularly. The rest however reported that they only visited a general dentist when having a dental complaint such as toothache or tooth/restoration fracture.

None of patients diagnosed with OPMDs have heard of the term oral cancer screening, none practiced self-examination of the oral cavity, and none knew that oral cancer might develop from a precursor lesion such as an OPMD. Some 44.8% of patients diagnosed with OPMDs thought that smoking and alcohol drinking could be harmful to oral health and could cause oral cancer.

## Discussion

The results of our study showed that the prevalence of OPMDs in the Arab population studied is 2.8%, a figure closer to recorded results from Western rather than Asian studies. Smoking in the form of cigarettes and narghile- a tobacco pipe that draws smoke through water is the main risk habit for oral cancer among Arab patients. The findings of our study showed that smoking was more prevalent among patients with OPMDs. Alcohol drinking is not regarded as particularly common among Arab patients, due to religious and cultural factors. Nevertheless, the findings of our study showed that drinking alcohol was surprisingly fairly common (17.2%) among patients with OPMDs, and a history of alcohol drinking was significantly associated with diagnosis of OPMDs. Other risk habits such as smokeless tobacco, betel quid, and areca nut use are also particularly uncommon in the Arab world and were not practiced by any of the study patients. This pattern of risk habits could explain the observed prevalence of OPMDs which was more similar to prevalences reported from western countries rather than Asian countries where habits such as smokeless tobacco, betel quid, and areca nut are much more common (Johnson et al., 2011; Sujatha et al., 2012; Mini et al., 2014; Alsanosy, 2014).

Similar to other studies, our findings showed that lichen planus and lichenoid lesions were the most common types of OPMDs (Napier et al., 2003; Warnakulasuriya et al., 2011). Although there is controversy as to the potentially malignant nature of these conditions (Lodi et al., 2005; Van der Meij et al., 2007), it is generally accepted that lichen planus/lichenoid lesions can be OPMDs (Warnakulasuriya et al et al., 2007; Van der Waal, 2014). The exact mechanism that drives lichen planus/lichenoid lesions to cancer is not known, but it is believed that the chronic inflammatory microenvironment in lichen planus might cause crucial DNA damage which over time results in cancer development (Georgakopoulou et al., 2012).

Leukoplakia and especially erythroplakia are the better known OPMDs. Our study revealed a prevalence of 0.38% and 0.096% respectively in our Arab population studied; figures that are similar to other studies (Reichart et al., 2005; van der Waal, 2009). The risk of malignant transformation varies according to the size of the lesion, site within the mouth, clinical appearance, and histological features (Scully and Bagan, 2009). Erythroplakia has a significantly high risk of malignant transformation. In our study, one patient was clinically diagnosed with erythroplakia in the right lateral border of the tongue. Unfortunately, it was proven to be an invasive SCC upon histopathological examination; a finding that underpins the importance of histopathological examination of any persistent red lesion particularly in suspicious sites such as the lateral border of the tongue and the floor of the mouth (Scully, 2013).

Oral epithelial dysplasia is considered by many

authorities as the gold standard to predict the risk of malignant transformation. For example, Warnakulasuriya et al, 2011 reported a significantly higher risk of malignant transformation among OPMDs showing higher grade dysplasia. Other studies however, found no association between epithelial dysplasia and malignant transformation (Holmstrup et al., 2006; Arduino et al., 2009) and there is some controversy as to the best dysplasia grading system to employ. In the present study, epithelial dysplasia (mild) was found in one patient with lichenoid lesion. Interestingly, all cases clinically diagnosed as leukoplakia were of the homogenous type and showed no histopathological evidence of dysplasia. Similarly, none of the cases diagnosed as chronic hyperplastic candidiosis showed evidence of dysplasia. Regardless of the existence of dysplasia, all patients in our study were offered treatment and scheduled for regular follow-up appointments. With the lack of reliable clinical, molecular, and histopathological markers of malignant transformation, early detection and treatment and identification of at risk patients remain the most important approach for reducing the risk of malignant transformation (Scully 2014).

The findings of the present study revealed an alarming lack of awareness and negative attitudes toward early diagnosis among our Arab patients with OPMDs. Only 13.8% visited a dentist regularly, none knew that oral cancer can develop from a precursor lesion and that therefore there is a chance of detecting the disease at an earlier stage, and less than half believed that smoking and alcohol use can cause oral cancer.

All patients diagnosed with OPMDs in the present study visited their dentists at least once during the past six months. Disappointingly, only two were informed that they have oral mucosal lesions and none have been given information about the nature of the lesion or its malignant potential. These findings indicate a serious lack of knowledge about OPMDs among dental practitioners. Interventions to improve dentists` knowledge about OPMDs are therefore urgently needed.

The findings of the present study are limited by the fact that it only included patients attending dental clinics at our hospital. These patients however are not necessarily representative of the general population of Jordan. Therefore further large scale population-based studies are needed to determine the prevalence and risk factors of oral cancer and OPMD in the Arab world.

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