Prevalence of oral mucosal lesions in an adult population from eight communities in Santo Domingo, Dominican Republic

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ABSTRACT

The purpose of the study was to evaluate the prevalence of Oral Mucosal Lesions (OMLs) in an adult population from Santo Domingo, Dominican Republic. 751 subjects from eight communities from Santo Domingo accepted the invitation to participate in an oral screening from October 2016 to January 2017. 248 subjects were evaluated and clinically examined, age range 18-86 years. A validated instrument was designed to record demographic factors, age group, gender, anatomical location, presence or absence of OMLs, risk factors such as tobacco consumption and its frequency, and different forms of tobacco and alcohol use. A systematic oral clinical examination was conducted by a specialist. The presence or absence, and anatomic location of OMLs were recorded. The sample consisted of 44.4% males and 55.6 % females. 228 subjects had 1 or more lesions (91.9%), the median was 3 lesions per patient. In relation to risk factors, tobacco use in general was reported by 26.2 % of the subjects, with cigarette smoking reported by 75.4%, followed by other forms as "hookah" 9.2 %, marihuana 9.2%, cigars ("puros")4.6% and pipe smoking 1.5%. Among the oral lesions detected by screening, the non-pathological group was prevalent, and included physiologic melanin pigmentation as the most frequent (25.0%) followed by palatal/mandibular tori (20.2%), Fordyce granules (7.9%), and Exostosis (5.6%). Potentially malignant disorders (Oral Leukoplakia, Oral Lichen Planus and Actinic Cheilitis) corresponded to 2.2%, 0.3 %, and 0.3%, respectively. No malignancy was observed clinically. This study contributes to determining the prevalence of OMLs in Dominican Republic and to identifying risk factors. This is the first study reporting the prevalence of oral mucosal lesions among the Dominican adult population. This information is vital for establishing a public health program targeting the high-risk group to improve the oral health status in this population.

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Keywords: *mouth diseases- oral mucosa - Dominican Republic.*

Prevalencia de lesiones de mucosa oral en una población adulta de ocho comunidades en Santo Domingo, República Dominicana

RESUMEN

El objetivo del presente estudio fue evaluar la prevalencia de lesiones de la mucosa oral (LMO) en una población adulta proveniente de Santo Domingo, República Dominicana. 751 individuos procedentes de ocho comunidades de la provincia de Santo Domingo, respondieron a la invitación para participar en el examen bucal, desde Octubre 2016 a Enero 2017. 248 sujetos con un rango de edad de 18-86 años, fueron evaluados y examinados clínicamente. Se diseñó y validó un instrumento para obtener datos de factores demográficos, grupos de edad, género, localización anatómica, presencia o ausencia de lesiones de la mucosa oral, factores de riesgo tales como: consumo de tabaco, frecuencia, diferentes formas de uso de tabaco y alcohol. Un especialista en el área, realizó un examen clínico bucal sistematizado en el cual se evaluó y registró la presencia o ausencia de lesiones y su localización anatómica. De acuerdo a la distribución por género, 44.4% correspondió a masculino y 55.6 % femenino. 228/248 sujetos presentaron 1 o más lesiones (91.9%), siendo la media de 3 lesiones por paciente. En relación a los factores de riesgo, el tabaco se reportó en 26.2%, siendo el fumar cigarrillos el 75.4%, seguido de otras formas como "hookah" 9.2%, marihuana 9.2%, cigarros ("puros") 4.6% y pipa fumada 1.5 %. En cuanto a las lesiones bucales detectadas en el examen, el grupo de condiciones no patológicas fue el más frecuente e incluía a pigmentaciones fisiológicas melánicas (25.0%), seguida de torus palatino/mandibulares (20.2 %), gránulos de Fordyce (7.9%) y exostosis (5.6%),respectivamente. Las lesiones potencialmente malignas detectadas (Leucoplasia oral, Liquen plano oral y Queilitis actínica) correspondieron al 2.2%, 0.3 % y 0.3%, respectivamente. Clínicamente, no se observó malignidad. Este estudio contribuye a determinar la prevalencia de LMO en República Dominicana e identificar factores de riesgo. Los hallazgos representan el primer estudio que muestra la prevalencia de las lesiones de mucosa oral en la población adulta dominicana. Se recomienda la creación de un programa de salud pública orientado a grupos de alto riesgo para mejorar el estatus de salud oral en esta población.

Palabras clave: *lesiones bucales - mucosa oral - República Dominicana.*

INTRODUCTION

Numerous professionals have focused on the importance of identifying Oral mucosal lesions (OMLs), during routine dental treatments. Therefore, epidemiological studies designed to understand the prevalence and incidence of OMLs have been undertaken, which contribute to identifying risk factors in different populations. Ali *et al*.[1] conducted a study to determine the number, types and location of OMLs in patients attending the Admission Clinic at Kuwait University Dental Center, designed to identify risk factors for oral lesions. Oral lesions were divided into six major groups: white, red, pigmented, ulcerative, exophytic and miscellaneous. A total 530 subjects were screened, of whom 308 presented one or more lesions, mainly in the age group of 40 years, and more often associated to smokers than non-smokers. Pentenero *et al.*[2] carried out a retrospective study on 4,098 subjects in an adult population from Turin (Italy), analyzing the association between OMLs and tobacco, alcohol consumption and removable denture wearing. The results showed that tobacco and alcohol was linked with higher prevalence of OMLs, in particular candidiasis, traumatic and frictional lesions. Mehrotra *et al.*[3] determined the prevalence of oral soft tissue lesions in 3,030 subjects from a semi-urban district in Vidisha (India). They explored not only the prevalence, but also attempted to correlate numerous risk factors. Carrard *et al.*[4] conducted a cross-sectional study in an urban population in southern Brazil to assess the prevalence of OMLs based on a multivariable risk assessment of demographic, socioeconomic, behavior and oral risk indicators, concluding that this population needed OMLs prevention and treatment. Their findings on potentially malignant oral lesions were related to smoking, alcohol and socioeconomic disparities. Amadori *et al*.[5] analyzed OMLs in adolescents in a retrospective cross-sectional study. A total 1,544 cases were registered with 36 different OMLs types, and included healthy and systemic disease. Rivera *et al*.[6] also documented a retrospective study to evaluate the frequency of OMLs in an elderly Chilean population. They used the WHO epidemiological guide for oral disease, finding and classifying 277 lesions. Prinyanka *et al*.[7] documented that the prevalence of mucosal lesions among alcohol-dependent subjects was 31.5%, which was higher than in the controls (25%). Ottapura *et al*.[8] reported the prevalence of OMLs in association to tobacco among migrant workers, showing that current use of smoked tobacco, smokeless tobacco and alcohol was 41.8%, 71.7% and 56.6%, respectively. OMLs were seen in 36.3% of participants and 44.6% of the smokeless tobacco users presented lesions. Additionally, the lesions were more common among current alcohol users (42.8%) than non-users (12.3%). To the best of our knowledge, there are no previous published data on the epidemiological evaluation of OMLs in adult subjects from Dominican Republic. The purpose of this study was to evaluate the prevalence of OMLs in an adult population from eight communities in Santo Domingo, Dominican Republic. This study represents the first screening-based research conducted in the country, and it will contribute to understanding and preventing OMLs.

MATERIALS AND METHODS

This study was conducted in accordance with the Declaration of Helsinki (1975), as revised in 2013, and reviewed and approved by the National Committee of Bioethics (CONABIOS) (Protocol # 042-2016), Santo Domingo, Dominican Republic.

Participants

The total population consisted of 751 subjects from eight different communities in Santo Domingo, Dominican Republic. The researchers visited the selected neighborhoods to define an appropriate study setting and distribute invitation flyers to residents. Individuals that accepted the invitation to participate in an oral screening visited the clinical facilities. To participate in the study, subjects had to meet the following inclusion criteria: good general health, 18 years of age or older. 248 individuals met the inclusion criteria and were clinically examined from October 2016 to January 2017. A questionnaire was used to record sociodemographic factors, including occupation, socioeconomic level, level of education, age and gender. Other risk factors such as tobacco consumption (active or current smoker, former smoker or never smoker), as well as the frequency of smoking and other forms of tobacco consumption; alcohol use, independently or in combination, and types of alcohol (rum, wine, whisky, beer, liqueur) as form of alcohol exposure were investigated. Other factors such as denture wearing or prosthesis were also recorded.

Clinical examination

A systematic intraoral clinical examination was conducted by a single examiner who is specialist in the area of Oral Medicine and Pathology. The examination was performed using dental light, mirror, spatulas and gauze. The clinical diagnosis was established and classified according to the epidemiology guide for the diagnosis of oral mucosal diseases (ICD-WHO)[9]. Correlation with risk factors was assessed. The following items were assessed during the clinical examination: appearance of the lesion, anatomical location, extension, dental status, trauma, use of prosthesis and whether the prosthesis was well adapted. In addition, cases requiring further examination or biopsies were referred to the Department of Periodontology, School of Dentistry, Pontificia Universidad Católica Madre y Maestra, Santo Domingo, Dominican Republic for definitive diagnosis.

Statistical analysis

The data was tabulated using Microsoft Office Excel®2016, and processed for analysis using StataIC®14.0. Quantitative variables were expressed as mean and standard deviation (± SD) and qualitative variables were summarized as percentages (%). Proportions were compared using the Chi Square Test (X2) and quantitative values were compared using the Mann Whitney U-Test. All statistical analyses were performed at a level of 95%, considering a p-value of ≤ 0.05 as statistically significant.

RESULTS

Of the total 248 clinically evaluated subjects, 138 (55.6%) were female, and 110 (44.4%) were male. The minimum age was 18 and the maximum was 86 years, with mean value 42.48 years (SD ± 16.55). In relation to risk factors, tobacco use was reported by 26.2 % of the examined subjects, of whom 75.4% were cigarette smokers. Other types of tobacco consumption were "hookah", which is a mixture of tobacco and herbs smoked in a pipe, cigars ("puros") and pipe (Fig. 1). Only 44 subjects answered the question on how long they had been using tobacco, and an average of 21.56 years was recorded (SD ± 15.80).

Alcohol consumption was reported by 63.7% of subjects, beer being the most popular drink, followed by rum, wine, whisky and "aguardiente"; all of them reported drinking at least once a week (Fig. 2).

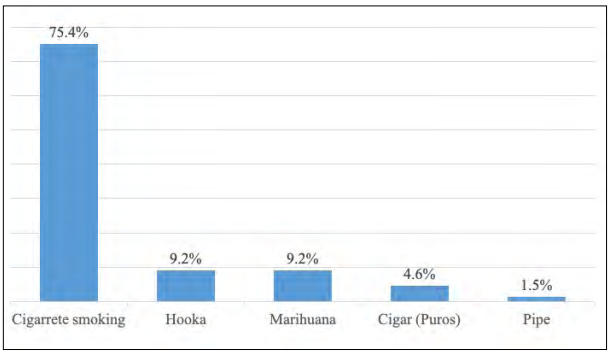

Fig. 1: Distribution of different forms of tobacco consumption.

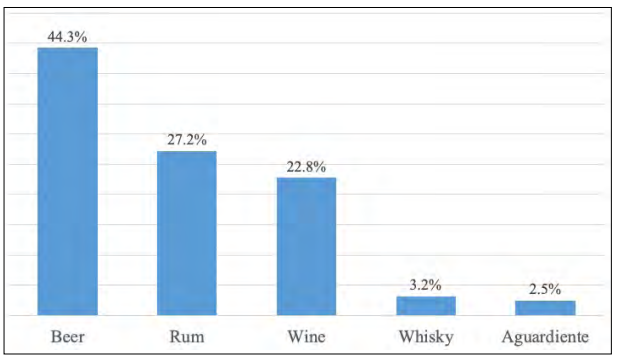

Fig. 2: Distribution of different forms of alcohol consumption.

Use of removable dentures/ prosthesis was reported by 1.3% of the study population.

Table 1 shows the distribution of the evaluated subjects according to the geographical location of the communities within Santo Domingo area. The distribution was homogeneous, so all regions were equally represented.

Table 1. Distribution of evaluated subjects according to geographical location in Santo Domingo metropolitan area.

Santo Domingo Communities	Number of Subjects	Frequency (%)
Mejoramiento Social	41	16.5
San Gerónimo	38	15.3
La Zurza	38	15.3
Miramar	29	11.7
Los Guandules	27	10.9
Arroyo Hondo	27	10.9
Los Ríos	26	10.5
Bella Vista	22	8.9
Total	248	100.0

Source: Santo Domingo communities, Dominican Republic

A total 228 out of the 248 evaluated subjects (91.9%) exhibited 1 or more OMLs, with a range of 1 to 7 lesions per patient and a mean of 3 lesions (Table 2). Physiologic melanin pigmentation was the most frequently found entity, followed by palatal / mandibular tori. Potentially malignant disorders detected were Oral Leukoplakia, Oral Lichen Planus and Actinic Cheilitis, corresponding to 2.2 %, 0.3 % and 0.3 %, respectively, of the total lesions detected (Table 3). Fig. 3 shows examples of clinical features of the diagnosed lesions.

Regarding the anatomical site of the OMLs, mandibular gingiva was the most frequent site, followed by maxillary gingiva, oral mucosa, hard palate and tongue (Table 4). When OMLs clinical

Table 2. Number of lesions per patient.

Number of lesions	Number of subjects	Frequency (%)
0	20	8.1
1	38	15.3
2	70	28.2
3	77	31.0
4	26	10.5
5	12	4.8
6	4	1.6
7	1	0.4
Total	248	100.0

Table 3. Distribution of oral lesions according to clinical type

Clinical diagnosis	n	%*	Clinical diagnosis	n	%*
Physiologic melanin Pigmentation	151	25.0%	Papilloma	2	0.3%
Palatal/mandibular Tori	122	20.2%	Dento alveolar abscess	2	0.3%
Fordyce Granules	48	7.9%	Mucocele	2	0.3%
Exostosis	34	5.6%	Lichen planus	2	0.3%
Denture Stomatitis	17	2.8%	Cheilitis	2	0.3%
Nicotine Stomatitis	15	2.5%	Commissural Pits	2	0.3%
Periodontal Disease	14	2.3%	Multifocal Epithelial Hyperplasia	2	0.3%
Pericoronitis	13	2.2%	Actinic Cheilitis	2	0.3%
Smoker Melanosis	13	2.2%	Peripheral Fibroma	2	0.3%
Leukoedema	13	2.2%	Benign Fibro-osseous lesion	2	0.3%
Lingual Varicosities	13	2.2%	Occlusal line	2	0.3%
Leukoplakia	13	2.2%	Piercing associated lesion	2	0.3%
GeographicTongue(Migratory Glossitis)	11	1.8%	Indented Tongue	2	0.3%
Melanotic Macule	10	1.7%	Recurrent Aphthous Stomatitis	2	0.3%
Frictional keratosis	9	1.5%	Circumvallate hyperplastic papillae	2	0.3%
Traumatic Ulcer	9	1.5%	Sialadenitis (Labial)	1	0.2%
Fissured Tongue	9	1.5%	Papillary inflammatory hiperplasia	1	0.2%
Inflammatory Fibrous Hyperplasia	7	1.2%	Black hairy Tongue	1	0.2%
Morsicatio Buccarum	6	1.0%	Verruga vulgaris	1	0.2%
Traumatic Fibroma	6	1.0%	Mandibular Atrophy	1	0.2%
Frenum Tag	5	0.8%	Hemangioma	1	0.2%
Pseudomembranous Candidiasis	5	0.8%	Desquamative Cheilitis	1	0.2%
Ankyloglossia	5	0.8%	Lichenoid oral reaction	1	0.2%
Coated Tongue	4	0.7%	Tonsillitis	1	0.2%
Commissural Cheilitis	4	0.7%	Nevus	1	0.2%
Pyogenic Granuloma	3	0.5%	Ranula	1	0.2%
Enamel Hypoplasia	3	0.5%	Foliate Papillitis	1	0.2%
Total				604	100.0%

*Based on the total number of lesions observed.

Fig. 3: Oral mucosal lesions in the study population. a) Smoker Melanosis. b) Physiologic Melanin Pigmentation. c) Oral Lichen Planus. d) Oral Leukoplakia. e) Actinic Cheilitis. f) Mandibular Exostosis. g) Inflammatory Papillary Hyperplasia. h) Benign Migratory Glossitis (geographic tongue).

Table 4. Anatomical sites of oral mucosal lesions

Anatomic Location	number of lesions	%*
Mandibular Gingiva	170	28.1%
Maxillary Gingiva	163	27.0%
Buccal Mucosa	80	13.2%
Tongue	43	7.1%
Hard Palate	33	5.5%
Lower Lip	27	4.5%
Upper Lip	24	4.0%
Mandibular Retromolar	21	3.5%
Soft Palate	10	1.7%
Lower vestibule	8	1.3%
Maxillary vestibule	6	1.0%
Lingual frenum	4	0.7%
Floor of the mouth	4	0.7%
Upper labial frenum	3	0.5%
Vermillion	3	0.5%
Lower labial sulcus	1	0.2%
Maxillary retromolar	1	0.2%
Anterior pillar	1	0.2%
Uvula	1	0.2%
Posterior pillar	1	0.2%
Total	604	100.0%

diagnosis was correlated with anatomical sites, Oral Leukoplakia and buccal sulcus, on both upper and lower jaws, were positively associated ($p \leq 0.05$). Additionally, other positive associations were found among subjects in the non-pathological conditions group: physiologic melanin pigmentation associated to maxillary and mandibular gingiva, exostosis associated to maxillary gingiva, Fordyce granules associated to oral mucosa and upper lip, and Palatal Torus associated to hard palate, all showing statistically significant association ($p \leq 0.05$).

DISCUSSION

The current study revealed that tobacco in general was as a risk factor in 26.2% of the study population, with cigarette smoking being the most common form. Interestingly, other forms of tobacco use such as smokeless tobacco, documented in previous reports from the literature and related to oral lesions in other countries, especially in the Asian subcontinent (Mehrota *et al*.[3]), were not recorded in the eight communities examined in Santo Domingo. In addition, the practice of "inverted" cigarette smoking, which is relatively common in some Latin American countries, specifically in South America, Venezuela and Colombia[10], was not observed in this Caribbean population either. The present study results regarding tobacco use as a risk factor are similar to those of previous investigations in Kuwait and India[1,3] and contrary to Ottapura *et al*.[8], who reported high prevalence of smokeless tobacco use. Another risk factor considered in this study was alcohol consumption. Beer was found to be the commonest form used on a weekly basis. Other alcohol forms included rum, wine, whisky and, less frequently, "aguardiente". Prinyanka *et al*.[7] analyzed

the prevalence of OMLs in alcohol-dependent and non-alcohol dependent subjects, finding a 31.5% increased risk of oral lesions in alcohol dependent subjects. Among potentially malignant oral lesions in the Prinyanka study, oral leukoplakia was the most frequently observed, followed by Submucous fibrosis, Eritroplakia and Candidiasis. In the present study, Oral Leukoplakia was also the most frequently observed potentially malignant lesion. Oral lichen planus (OLP) and Actinic Cheilitis were also observed. Regarding the clinical observation of Oral Lichen Planus, only the clinical reticular variant of OLP of bilateral occurrence on the oral mucosa was found.

In our study, the age range of patients with OMLs was 18 to 86 years, with mean age 42.48. Other prevalence studies on OMLs have reported a broader age range, including children and adolescents[1,5]. Rivera *et al.*[6] documented higher occurrence of OMLs in an elderly Chilean population. Mujica and Rivera[11] studied a 60- to 74-year-old group of institutionalized patients, finding OMLs mainly associated to trauma caused by dentures.

Raposo *et al.*[12] documented the prevalence of OMLs at a reference hospital in Temuco, Chile, in 300 patients over 20 years of age, finding frequencies of Fordyce granules 30%; Atrophic candidiasis 14.33%; Melanotic macule 13.67%; Lingual varicosities 7.33%; Physiologic pigmentation 6%; Pigmented nevus 4%; Ephelides 3.33%; Traumatic ulcers 4%; Oral leukoplakia 3% and Angular cheilitis 2.68%. These results agree with the present study, where non-pathological conditions were the most prevalent. These authors also showed a statistically significant association between increasing age and the presence of Atrophic candidiasis, Traumatic ulcers and Lingual varicosities. For gender distribution, our study found a slight female preponderance. This is similar to a previous report by Casnati *et al.*[13] which analyzed an urban adult population of Uruguay. These authors also report a correlation of Oral Leukoplakia with "yerba mate" consumption, a common practice in some South American countries such as Uruguay and Argentina. This specific type of consumption was not observed in the evaluated Dominican population.

In the present study, the predominant location observed was on mandibular gingiva, followed by maxillary gingiva, oral mucosa and hard palate as the commonest sites. This particular finding could be related to the presence of Physiological melanin pigmentation, a relatively common condition observed in the study population due to ethnic factors. In contrast, another study by Mehrota *et al.*[3] reported other anatomical sites such as oral mucosa as being the most frequent location for OMLs.

Non-pathological conditions such as Physiologic melanin pigmentation, palatal/mandibular tori and Fordyce granules were more frequent than pathological lesions. Among the latter, those associated to the use of dentures, as Denture Stomatitis, Smoker's palate (Nicotine Stomatitis) and Inflammatory conditions such as plaque-related gingivitis and pericoronitis were the most frequently found. Among the potentially malignant disorders, Oral Leukoplakia was the most frequent lesion, followed by Oral Lichen planus and Actinic cheilitis. It is worth noting that neither Oral Squamous Cell Carcinoma, the most common form of oral cancer, nor other forms of malignancies were detected in this investigation. A low frequency of oral cancer was also detected in other populations. Kansky *et al.*[14] documented only 9 cases of Oral Cancer in a sample of 2395 people in Slovenia. The fact that no evidence of malignancy was observed in this oral screening in the Dominican Republic deserves further studies, including evaluation of numerous risk factors as well as genetic and nutritional conditions.

When the OMLs were correlated with different anatomical sites, Oral Leukoplakia was positively associated to oral mucosa or sulcus ($p \leq 0.05$). Additionally, other significant positive associations were observed in the category of non-pathological conditions, such as between Benign migratory glossitis and tongue, physiological melanin pigmentation and maxillary and mandibular gingiva, exostosis and maxillary gingiva, Fordyce granules and oral mucosa and upper lip, Palatal Torus and hard palate. These results agree with those previously reported by Bhatnagar *et al*.[15] on the frequency of non-pathological alterations.

The use of dental prostheses is associated with an increase in OMLs. In our study, the proportion of patients with prostheses was low (1.3%), nevertheless, some reactive inflammatory lesions such as Fibrous Hyperplasia, Denture Stomatitis and Inflammatory Papillary Hyperplasia were detected. Our findings agree with previous studies by Yin *et al.*[16] in an oral survey from the Sichuan Province, China, where the incidence of dental prosthesis

use was 51.75%, with high prevalence of recurrent aphthous ulcers, oral lichen planus, Inflammatory Papillary Hyperplasia and Fibrous Hyperplasia.

The limitations of the present study should be acknowledged: it did not analyze socioeconomic level, which includes defined criteria of classification and not only income of the participant population, as well as nutritional factors, including validation of a food frequency questionnaire and anthropometric evaluation. Further studies on oral cancer screening and early detection should be implemented in this population. Because no data on oral cancer frequency have been reported previously in this population, no comparison could be made.

To the best of our knowledge, there are no preliminary published data on the epidemiological evaluation of OMLs in adults from Dominican Republic. This is the first screening–based research contributing to the understanding of the prevalence and severity of OMLs in the Dominican Republic and identifying risk factors in this population. The present study also provides baseline data for future studies for improving oral health in the country. Further screening studies in this population should include diet, nutrition, and socioeconomic factors that may influence the presence of OMLs.

Another advantage of this type of study is that it provides an exceptional opportunity for dentists to educate patients on the link between smoking and oral potentially malignant lesions.

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DECLARATION OF CONFLICTING INTERESTS

The authors declare no potential conflicts of interest regarding the research, authorship, and/or publication of this article

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