Factors Related to Oral Mucosal Lesions Among Tobacco Smokers in A Fisher Community of Indonesia

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ABSTRACT	ARTICLE DETAILS

Background: Oral mucosal lesions (OMLs) are precursors of oral cancer which affect the quality of life, such as difficulty swallowing, pain, and mastication. These lesions were found related to tobacco consumption. In Indonesia, almost half of the fishers were active tobacco smokers

Objectives: This study aims to find the prevalence and factors related to oral mucosal lesions among fishers in Jember, Indonesia.

Methods: In this cross-sectional study, oral examination for mucosal lesions and interviews were conducted among 301 fishers. Kruskall Wallis test was run to seek the association of respondent's demographic, character-smoking habits, and prevalence of oral mucosal lesions. Chi-squre test was conducted for every lesion to find the correlation between demographic characteristics and smoking habits.

Result: One or more mucosal lesions were found in 97,7% of the population. Melanosis was observed the most frequently (88.4%), followed by frictional keratosis (33.9%), candidiasis (32.6%), black hairy tongue (6%), nicotine stomatitis (5.3%), leukoplakia (2%). This study found that a majority of fishers use filter cigarettes (73.1%), and they use > 20 cigarettes per day (70.1%). The number of oral mucosal lesions was higher among the older age group, lower education status, and more frequent smokers.

Conclusion: The prevalence of oral mucosal lesions among smokers in the fishers community was high and related to sociodemographic factors and a smoking habit.

KEYWORDS: Epidemiology, Mouth mucosa, Mouth diseases, Tobacco smoking.

ARTICLE DETAILS

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INTRODUCTION

Oral mucosal lesion (OML) is any abnormal alteration in surface aspect, color, swelling, or loss of integrity of oral mucosal surfaces [1]. OMLs are precursors of oral cancer [2]. Oral cancer is the eighteen highest cases cancer site worldwide in 2000 [3]. Furthermore, OMLs can affect the quality of life in daily activities such as pain, mastication, swallowing, and speech problems due to symptoms of the lesions [1]. OMLs have a variety of etiologies such as infection of virus or bacteria or fungi, irritation or local trauma, systemic disease, and excessive consumption of alcohol, betel quid, and tobacco [4].

Tobacco is one of the leading causes of both addiction and the development of oral malignancies [5]. Tobacco contains thousands of chemical compounds which Act not only as toxins and irritants but also are potent carcinogens. Nicotine in tobacco is an alkaloid responsible for addiction, and tobacco-specific nitrosamines, polycyclic aromatic hydrocarbons, and many others are the most deadly carcinogens [6].

Data from World Health Organization showed that globally, 22.3% of the population 15 years older smoked tobacco in 2020. Tobacco use was attributed to over 8 million people dying worldwide in 2019. Southeast Asia has the highest tobacco users among other regions [7]. Indonesia had the highest number of smokers worldwide after China and India [8]. It was suggested that there was a relationship between employment and smoking habits [9]. Data from the Indonesia health survey (Riskesdas) in 2013 showed that 44.5% of

fishers, farmers, and factory laborers are active daily tobacco smokers [10].

Indonesia has the longest coastal area in the world, where the fisher communities live in the area around the harbor and sea coast. In literature, epidemiological studies of OMLs among fishers in Indonesia are still few. Understanding the prevalence of various types of OMLs among people in a specific area is essential for understanding its extension and characteristics and also for planning oral cancer prevention programs. Therefore, this study aims to investigate the prevalence and factors related to oral mucosal lesions in a fishermen population living in the village around the harbor of Puger, Jember, Indonesia. This study helps develop primary prevention, early diagnosis, and prompt oral cancer treatment for this population.

METHODS

This study is a cross-sectional study that was conducted in Puger Kulon village, Jember, Jawa Timur, Indonesia, where Puger harbor is located. The data collection was from Januari-February 2020. This study was undertaken on fisher's current tobacco smokers. Current smokers were defined as fishers who had been smoking tobacco for at least six months. Inclusion criteria were fishers aged older than 16 years and no maxillary complete denture. Purposive sampling was used. A total of 301 fishers were included in this study. Ethical clearance was obtained from the Ethical Committee of Medical Research, Faculty of Dentistry, Universitas Jember. Before participating in this study, written informed consent was collected from the subjects.

The participants were examined clinically with artificial lighting and a mouth mirror. According to the WHO guidelines, the diagnosis was made based on clinical features, history, and investigation [11]. After a clinical examination was performed, every participant completed a questionnaire regarding their demographic characteristics and smoking habits, such as types of cigarettes and frequency. Periodontal lesions, carious lesions, and endodontic lesions were excluded from this study.

The results were analysed by the SPSS software version 25. Descriptive statistics were presented for all variables. Kruskall Wallis tests were used to seek the association of the number of oral mucosal lesions and socio-demographic and smoking habit factors. Chi-Square and Kolmogorov Smirnov tests were calculated to find the association between every mucosal lesion and socio-demographic and smoking habit factors. For tests of significance, a p-value <0.05 was considered significant.

RESULTS

Table 1 shows the demographic characteristics of the study population. A total of 301 fishers who smoked cigarettes and lived in Puger Kulon village were recruited. No female fishers were found in the study. The mean age of the participants was 40.52 years, with the minimum age was 17 years, and the maximum age was 55 years. Of the subjects, the highest percentage was 36-45 years (34.6%), followed by the 46-55 age group (32.2%). In this study, most fishers had maximum elementary school education (52.2%), while less than 10% had senior high and higher education levels. In terms of ethnicity, 230 participants (76.4%) were Javanese and followed by Madurese (22.9%) and Malay (0.7%).

Table 1. Demographic Characteristic of The Population (N=301)

Characteristics	Frequency	Percentage (%)
Sex		
Male	301	100
Female	0	0
Age (years)		
17-25	25	8.3
26-35	77	25.6
36-45	102	33.9
46-55	97	32.2
Education		
No education	34	11.3
Elementary	157	52.2
Junior high	81	26.9
Senior high	28	9.3
Higher edu	1	0.3
Ethnicity		
Javanese	230	76.4
Madurese	69	22.9
Malay	2	0.7

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In this study, a high proportion (70.8%) of fishers were heavy smokers (more than 20 cigarettes/day), as presented in Table 2. Most of them were using filtered cigarettes at 73.4% (221 participants). The study found no other tobacco habits, such as tobacco chewing, among the fishers.

Table 2. Tobacco Smoking Characteristics of The Study Population (N=301)

	Frequency	Percentage (%)
Cigarette types		
Filtered	220	73.4
Non-filtered	35	11.3
Mixed	46	15.3
Smoking intensity /day		
≤ 10 cigarettes		
11-20 cigarettes	15	4.3
>20 cigarettes	75	24.9
	211	70.8

This study reports that 97.7% of the fishers smoking cigarettes had one or more mucosal lesions with a range of 0-5 lesions. As shown in Table 3, the most prevalent lesion was smoker melanosis (88.4%), followed by frictional keratosis (33.9%), candidiasis (32.6%), fissure tongue (10%), black hairy tongue (6%), nicotine stomatitis (5.3%), leukoplakia (2%), stomatitis (1.3%) and geographic tongue (0.7%).

Table 3. The Prevalence of Oral Mucosal Lesions Among Smoker Fishers (N=301)

Oral Mucosal Lesions	Frequency	Percentage (%)
Melanosis	266	88.4
Frictional keratosis	106	35.2
Candidiasis	98	32.6
Black hairy tongue	18	6.0
Nicotine stomatitis	16	5.3
Leukoplakia	6	2.0

Table 4 presents the association between the number of mucosal lesions found and the socio-demographic and smoking habits of the study population. There is a highly significant correlation between the prevalence of oral mucosal lesions and age (p=0.02), and smoking intensity (p=0.00). A significant relationship is also found between the Prevalence of oral mucosal lesions and education (p=0.038). No significant relationship exists between the prevalence of mucosal lesions and ethnicity (p=0.826) and cigarette types (p=0.395). In more detail, every lesion was analysed to find its association with the respondents' sociodemographic characteristics and smoking patterns, as presented in Table 5.

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Table 4. Bivariate Analysis Between The Number of Oral Mucosal Lesions and Socio-Demographic and Smoking Habit Factors (N=301)

Characteristics	Mean Rank	P-value
Age (years)		0.002
17-25	106.08	
26-35	135.81	
36-45	159.35	
46-55	165.85	
Education		0.038
No education	178.51	
Elementary	153.21	
Junior high	145.74	
Senior high&higher	121.48	
Ethnicity		0.826
Javanese	150.17	
Madurese	152.85	
Malay	183.00	
Cigarette types		0.395
Filtered	147.31	
Non-filtered	164.54	
Mixed	158.34	
Smoking intensity /day		0.000
≤ 10 cigarettes	99.60	
11-20 cigarettes	130.08	
>20 cigarettes	162.09	

Significant, p value <0.05.

Table 5. Bivariate Analysis of Every Oral Mucosal Lesion to Socio-Demographic and Smoking Habit Factors

Characteristics	N (301)	Melanosis	Frictional keratosis	Candidiasis	Black hairy tongue	Nicotine stomatitis	Leukoplakia
Age (years)							
17-25	25	22 (88%)	6 (24%)	2 (8%)	0	2 (8%)	0
26-35	77	66 (86%)	25 (33%)	21 (27%)	2 (3%)	5 (7%)	3 (4%)
36-45	102	97 (95%)	35 (34%)	37 (36%)	6 (6%)	2 (2%)	3 (3%)
46-55	97	81 (84%)	36 (37%)	38 (39%)	10 (10%)	7 (7%)	0
P value		0.412	0.214	0.015	0.008	0.315	0.223
Education							
No education	34	28 (82%)	14 (41%)	16 (47%)	5 (15%)	1 (3%)	0
Elementary	157	137 (87%)	55 (35%)	50 (32%)	11 (7%)	11 (7%)	3 (2%)
Junior high	81	75 (93%)	24 (30%)	27 (33%)	2 (3%)	2 (3%)	3 (4%)
Senior high	28	25 (89%)	9 (32%)	5 (18%)	0	2 (7%)	0
Higher edu*	1	1 (100%)	0	0	0	0	0
P value		0.567	0.717	0.161	0.036	0.589	0.645
Ethnicity							
Javanese	230	202 (88%)	85 (37%)	69 (30%)	13 (6%)	10 (4%)	6 (3%)
Madurese	69	62 (90%)	17 (25%)	28 (41%)	4 (6%)	6 (9%)	0
Malay	2	2 (100%)	0	1 (50%)	1 (50%)	0	0
P value		0.788	0.099	0.225	0.031	0.349	0.389
Cigarette types							
Filtered	220	198 (90%)	68 (31%)	67 (31%)	12 (6%)	11 (5%)	4 (2%)
Non-filtered	35	28 (80%)	15 (43%)	17 (49%)	2 (6%)	3 (9%)	0
Mixed	46	40 (87%)	19 (41%)	14 (30%)	4 (9%)	2 (4%)	2 (4%)
P value		0.218	0.196	0.099	0.699	0.648	0.358
Smoking intensity /day	15	13 (87%)	3 (20%)	1 (7%)	0	0	1 (7%)
≤ 10 cigarettes	75	62 (83%)	24 (32%)	21 (28%)	4 (5%)	2 (3%)	1 (1%)
11-20 cigarettes	211	191 (91%)	75 (36%)	76 (36%)	14 (7%)	14 (7%)	4 (2%)
>20 cigarettes		0.186	0.434	0.040	0.557	0.270	0.396
P value							

Significant, p value <0.05; *data was merged during statistical analysi

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DISCUSSION

This cross-sectional study reports that the prevalence of oral mucosal lesions (OMLs) among fishers was 97.7%. Most of the subjects had more than one oral lesion. This finding is higher than a study among the fishers population in South India (14.9%) [12]. The variations in the results were probably because of the different study populations, ethnic groups, geographic regions, and methodological lines. In this present study, the population was fishers with all men and had a low educational background. Furthermore, the respondents of this current study had been smoking cigarettes for at least six months and mostly consumed more than 20 cigarettes daily which may contribute to the higher prevalence of OMLs seen in this population. The high percentage of oral mucosal lesions may be related to the irritational effect of tobacco on oral structures, including host modulation and genetic factors [13].

In this study, the prevalence of oral mucosal lesions was significantly higher in older fishers than in younger fishers. The association of age and prevalence of oral mucosal lesions is consistent with previous studies in China [14] and Brazil [15]. This finding may be due to the aging process, carcinogen metabolism, impaired DNA repair capacity, reduced immunologic reactivity, and age-specific involution, especially of the oral epithelium and the salivary glands [16]. Moreover, older people's accessibility to dental facilities is generally lower than younger people's due to physical and financial limitations [14].

Another social factor related to the number of OMLs was education status. This study found that a lower level of education was related to a higher number of mucosal lesions. This finding is similar to other studies from Malaysia [17]. It was suggested that higher education is correlated with higher income. A higher-income population will more easily afford health care services [18].

This study demonstrates a significant association between smoking intensity and the prevalence of OMLs. Fishers reporting heavy and moderate smoking were more likely to have OMLs than light smokers. Other studies in India [2], Brazil [15], and Australia [19] have reported similar results. Moreover, this study found Melanosis to be the most common lesion, which is followed by Frictional keratosis, Candidiasis, Black hairy tongue, Nicotine stomatitis, and Leukoplakia.

Smoker's melanosis occurred in 88.4% of the study participants. This finding is higher than reported in a study of a population on the Eastern Coast of South India [20]. Noxious agents in tobacco smoke stimulate the biological defense of the oral mucous in the form of increased production of melanocytes [21,22]. The intensity of the pigmentations is associated with the amount and duration of smoking, and it was stated that smoking up to nine cigarettes/day has produced gingival melanin deposition [23]. In this study, the

Majority of the study population consumed cigarettes more than ten cigarettes a day.

Frictional keratosis is white lesions of the buccal mucosa, tongue, and lip due to constant rubbing, chewing, or sucking [24]. The occurrence of this lesion was 35.2% of all subjects in this study. In some published studies, the prevalence of frictional keratosis varies from 46.9% among tobacco users in Chennai, Tamil Nadu [25] to 3.9% among tobacco users in the Yemeni population [26].

The prevalence of candidiasis in this study was 32.6%, and the occurrence was significantly related to age and smoking intensity. Candidiasis is a fungal lesion related to smoking, vitamin deficiencies, decreased immunology, high carbohydrate diets, poor oral hygiene, and others [27]. Previous studies showed the relationship between smoking cigarettes and oral candidiasis [28]. This study result indicated that the elder age group was more likely to have oral candidiasis, possibly due to a lower immune system of the mucosa and general health [29]. This study also found that the higher smoking intensity was significantly related to the occurrence of oral candidiasis. Nicotine in cigarettes thickens the epithelial keratinized layer in the mouth and stimulates structural and functional changes in keratinocytes as a facilitator of fungal colonization which increases the possibility of oral candidiasis [30]. Moreover, tobacco constituents are nutritional factors of *Candida albicans* [31].

This study reported that the prevalence of black hairy tongue was 6%, and the prevalence was associated with age, education, and ethnicity Black hairy tongue is hypertrophy of the lingual dorsum, which is characterized by a black/brownish pigmentation of the filiform papillae [32]. Different ethnic backgroud present more picmented lesions. This lesion is more commonly seen in more dark-skinned persons due to increased melanocytic activity [33].

Nicotine stomatitis or smoker's palate is a thickened and hyperkeratosis of the hard palatal mucosa with reddened papules elevations due to inflamed opening of minor salivary ducts, occasionally with fissuring of the palatal surface [34]. This lesion is predominantly caused by a high temperature of the palate rather than a chemical composition of the smoke, even though there is a combined effect of those two aspects [35]. The prevalence of nicotine stomatitis among the subjects is found to be 5.3% in this study. This result is similar to the study among the fishermen population in India (5.7%) [12] but lower than a study among smokers in UAE (10.8%) [35]. The prevalence of this pre-malignant lesion depends on the population's use of tobacco smoking which was more common in people with reverse smoking [36].

Leukoplakia is an asymptomatic and potentially malignant lesion in the oral mucosa. This lesion can be defined as a white patch or plaque which cannot be characterized clinically or pathologically like any other disease [37]. The prevalence of leukoplakia in this study population was 2 %. This result is lower than that reported

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among tobacco users in India [38] but higher than a study in Saudi Arabia (1.2%) [26]. This difference may be due to different cultures in terms of tobacco use.

A limitation of this study is that this study is a cross-sectional study that did not draw any inferences on causal relationships. Therefore, further studies on this population are required, which involve a longitudinal study that would consider the risk factors associated with oral mucosal lesions.

CONCLUSION

This study indicates that the prevalence of oral mucosal lesions is significantly high among tobacco smokers in this fishers population. This evidence showed the need for early cancer detection or screening for potentially oral malignant lesions. Moreover, tobacco cessation counseling and campaign and screening in this community need to be accounted for the sociodemographic factors to deliver effective health programs.

CONFLICT OF INTEREST: The authors declare no conflict of interest in the study.

ETHICAL DECLARATION: The study protocol was approved by the Ethical Committee of Medical Research, Faculty of Dentistry, Universitas Jember, the number 126/UN25.8/KEPK/DL/2019.

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