Introduction
Tobacco is derived from two main words, namely, Nicotiana tabacum and nicotiana rostina. Nicotine is the most crucial component in the leaves of this plant and one of the most addictive and stimulant drugs. Tobacco has different names around the world such as Betel quid, Khaini, Mishri, Zarda, Nass, Toombak, Shammah, Naswar, and Gitka (1).

The history of tobacco use dates back to nearly 500 years (2). In the 19th century, the use of tobacco decreased due to the introduction of the germ theory of infection by Louis Pasteur and Robert Koch, as well as calling it unhygienic. However, over time, its use spread due to its low price so that during a survey in 1974, there were about 22 million consumers in the United States of America (3). According to the World Health Organization, 22.3% of the global population, 36.7% of all men, and 7.8% of the world’s women used tobacco in 2020. Tobacco kills up to half of its users and more than 8 million people each year. More than 7 million of those deaths are the result of direct tobacco use, while around 1.2 million are the result of non-smokers being exposed to second-hand smoke (4).

It is reported that 14.1% of Iranian adults in 2016 were current tobacco users. The current tobacco smoking prevalence was 25.2% and 4.0% among men and women, respectively (5).

The International Carcinogenesis Agency has confirmed that the carcinogenic risk of non-smoking tobacco is carcinogenic and the most critical target organ

Prevalence of Mucosal Lesions in People Consuming Chewable Tobacco in Hormozgan Province, Iran
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Abstract
Background: Tobacco has a high level of carcinogenic components. The maximum effect of the component is on the oral cavity and the location of tobacco. Quantitative studies were conducted according to the oral effect of tobacco usage by people of the south of Iran, specifically in Hormozgan province. In this experiment, the prevalence of oral lesions was studied in people who use tobacco in Hormozgan province in 2018.

Materials and Methods: In this descriptive cross-sectional study, 395 patients were examined on oral lesions in Hormozgan province. Data were collected and described by a mean frequency table and then analyzed by a inferential statistical test such as the 2-dimensional chi-square test by SPSS, version 23 (P<0.05).

Results: Experiments showed that 75.5% (299 from 395) of patients had mucosal lesions. The most lesions were tobacco pouch, wound, white plaque, and erythematic lesions. In addition, a significant correlation was found among parameters, including all mucosal lesions with time, all mucosal lesions with age (except wound), white plaque and erythematic mucosal lesions with smoking, tobacco pouch, and white plaque with alcohol use. However, no significant correlation was observed between oral mucosal lesions with a history of family oral lesions, tobacco pouch and wound with cigarette usage, and wound and erythematic lesions with alcohol use.

Conclusion: Compared with other studies, oral mucosal lesions were highly prevalent in Hormozgan province. The possibility of oral mucosal lesions increases as one gets older; in addition, the duration of tobacco usage is a primary factor for the lesions.

Keywords: Chewing tobacco, Oral lesion, Prevalence, Hormozgan
is the oral cavity and the site where the substance is placed (6, 7).

Non-smoking tobacco products contain extensive arrays of carcinogens. The effects of these substances on the oral mucosa include squamous cell carcinoma, verrucaous carcinoma, and orally potentially malignant disorders (including leukoplakia, erythroplakia, and erythroleukoplakia), as well as tobacco pouch keratotic and oral submucosal fibrous (1).

Gum receding is the most common side effect associated with smokeless tobacco use. These reactions are irreversible, while mucosal lesions usually regress within two months. Dental caries has been reported with a higher prevalence in non-smoking tobacco users, which is probably due to the sugar content in some tobacco brands (8).

In their study, Krishna Priya et al concluded that oral mucosal lesions occur in people who consume cigarettes, chewing tobacco, and alcohol (9).

To the best of our knowledge, few studies have been concocted in this field. Considering the high prevalence of chewing tobacco consumption in people in the south of the country, especially in Hormozgan province, and its oral complications (rural malignant lesions), the present study investigated the prevalence of tobacco pouch mucosal lesions in individuals consuming chewing tobacco in Hormozgan province in 2019.

Materials and Methods

In this cross-sectional study, the random sampling method was used for sampling. Three hundred ninety-five patients were examined in Hormozgan province (Bastak, Rudan, Minab, Bandar Abbas, Parsian, Khamir, Sirik, Qeshm, and Bandar-e-Lengeh counties).

Inclusion Criteria

People who used chewing tobacco from February 2019 to the end of May 2019 and were admitted to the dental office with dental problems.

Exclusion Criteria

Patients with systemic disease, cancer history, radiotherapy, and chemotherapy were excluded from the study.

Diagnosis and Examination

The examination was performed by a last-year dental student for erythema, plaque, whitening, scarring, and leathery of the oral mucosa using a mirror, catheter, and periodontal probe under standard light.

Statistical Analysis

A checklist was used to collect patients’ data. The checklist included demographic questions about age, education, occupation, family history of oral lesions, systemic disease, number of times per day, duration of use, alcohol, and smoking. The statistical data were analyzed by statistical and descriptive methods (mean and standard deviation), t test, chi-square, and SPSS (version 23) statistical analysis, and the overall P value was less than 0.05.

Results

This study evaluated 395 people who used chewing tobacco from February 2019 to the end of May 2019. The average age of these people was 24.88 in the range of 12-58 years, most of whom had a diploma (n = 18) and a middle school degree (103). Most of them were self-employed (202) and unemployed (168). Overall, 100 (3.25%), and 127 (1.23%) people drank alcohol and smoked, respectively. Twenty-four (6%) of these individuals had oral lesions in other family members. The highest tobacco use was between one to five years (189 people). In addition, 207 (3.52%) of these people had tobacco pouches, and 26 (6.6%), 26 (6.6%), and 40 (10.1%) of them had erythema, white plaques, and wounds in their mouths, respectively. Of the 395 people examined, 299 had mucosal lesions. Therefore, the prevalence of mucosal lesions in people consuming chewable tobacco in Hormozgan province was 75% (Table 1).

The highest prevalence of tobacco pouch mucosal lesions in the age group over 51 years was 85.7%, and the lowest prevalence of tobacco pouch mucosal lesions in the age group of 10-20 years was 36.1. Using a 2-dimensional (2D) chi-square test, it was found that the development of tobacco pouch mucosal lesions is more likely in older people (P<0.05) (Table 1).

The prevalence of tobacco pouch mucosal lesions was 54.2% (13) and 52.4% (195) in people with and without a family history of oral lesions, respectively (Table 1).

Using a 2D Chi-square test, it was revealed that there is no significant relationship between the prevalence of tobacco pouch mucosa and family history of oral lesions in chewing tobacco users (P>0.05).

The prevalence of tobacco pouch mucosal lesions was 47.2% (60) and 54.6% (147) in smokers and non-smokers, respectively. 2D Chi-square tests were used, and no significant relationship was observed between the prevalence of tobacco pouch mucosal lesions and smoking in people who chew tobacco (P>0.05) (Table 1).

Similarly, the prevalence of tobacco pouch mucosal lesions was 64% (64) and 48.3% (143) in alcoholics and non-alcoholics, respectively. The P value=0.04 was obtained based on the results of the 2D chi-square test. Considering that the P value was less than the significant level of 0.05, there was a significant relationship between the prevalence of tobacco pouch mucosal lesions and alcohol consumption (Table 1).

According to the obtained data, the prevalence of mucosal lesions in people with a history of chewing
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Table 1. Prevalence of variables among participants

| Variable                        | No.  | Percent |
|---------------------------------|------|---------|
| Time of consumption             |      |         |
| Less than a year                | 156  | 39.4    |
| Five to one year                | 189  | 47.7    |
| More than 5 year                | 51   | 12.9    |
| Total                           | 395  | 100     |
| Alcohol and alcoholic drinks    |      |         |
| Consumer                        | 100  | 25.3    |
| Non-consumer                    | 296  | 74.7    |
| Total                           | 395  | 100     |
| Cigarette and tobacco products  |      |         |
| Consumer                        | 127  | 32.1    |
| Non-consumer                    | 269  | 67.9    |
| Total                           | 395  | 100     |
| Family history of oral Lesions  |      |         |
| Yes                             | 24   | 6.1     |
| No                              | 372  | 93.9    |
| Total                           | 395  | 100     |
| White plaque lesions            |      |         |
| Yes                             | 26   | 6.6     |
| No                              | 370  | 93.4    |
| Total                           | 395  | 100     |
| Erythematous lesions            |      |         |
| Yes                             | 26   | 6.6     |
| No                              | 370  | 93.4    |
| Total                           | 395  | 100     |
| Tobacco pouch lesions           |      |         |
| Yes                             | 207  | 52.3    |
| No                              | 189  | 47.7    |
| Total                           | 395  | 100     |

According to the findings, the prevalence of white plaque mucosal lesions in people who chew tobacco was 13% (13) and 4.4% (13), respectively. The results of a 2D chi-square test represented a significant relationship between the prevalence of white plaque mucosal lesions and alcohol consumption ($P<0.05$) (Table 1).

Additionally, the prevalence of white plaque mucosal lesions in people who drink and did not drink alcohol was 13% (13) and 4.4% (13), respectively. The results of a 2D chi-square test represented a significant relationship between the prevalence of white plaque mucosal lesions and alcohol consumption ($P<0.05$) (Table 1).

Based on the findings, the prevalence of wound mucosal lesions in the age group of 31-40 and 10-20 years was estimated as 16.3% and 5%, respectively. Using a 2D chi-square test, the results demonstrated that there is no significant relationship between the prevalence of wound mucosal lesions and the patient’s age ($P>0.05$) (Table 1).

The highest and lowest prevalence of white plaque mucosal lesions in the age group over 51 and 10-20 years was calculated at 42.9% and 0%, respectively. Using a 2D chi-square test, a significant relationship was observed between the prevalence of white plaque mucosal lesions and the patient’s age. Hence, as the age increases, people who consume chewing tobacco are more likely to develop white plaque mucosal lesions ($P<0.05$) (Table 1).

The results further demonstrated that the prevalence of white plaque mucosal lesions in people with and without a family history of oral lesions was 4.2% (1) and 6.7%, respectively (25). Based on the 2D chi-square test results, there was no significant relationship between the prevalence of white plaque mucosal lesions with a family history of oral lesions in people consuming chewing tobacco ($P>0.05$) (Table 1).

The prevalence of white plaque mucosal lesions in smokers and non-smokers was estimated at 10.2% and 4.8% (13), respectively. A 2D chi-square test was used to test the hypothesis that “the frequency of white plaque mucosal lesions is related to smoking”; based on the results of this test, people who smoke were more likely to develop white plaque mucosal lesions than people who did not smoke (Table 1).
alcoholics. After using a 2D chi-square test, a significant relationship was observed between the prevalence of wound mucosal lesions and alcohol consumption ($P < 0.05$) (Table 1).

The highest and lowest prevalence of wound mucosal lesions in the group of people with a history of chewing tobacco use for more than five years and less than one year was 17.6% (9) and 1.3% (2), respectively. One of the findings after using a 2D chi-square test was that as the duration of consumption increases, the probability of developing wound mucosal lesions in people who consume chewing tobacco represents an increase ($P < 0.05$) (Table 1).

In addition, the highest prevalence of erythematous mucosal lesions in those over 51 was calculated at 28.6%. The lowest prevalence of oral mucosal lesions in the age group 41-50 years was 0%. A 2D chi-square test was utilized to check the hypothesis that “the frequency of erythematous mucosal lesions is related to age”. As people get older, they are more likely to develop erythematous mucosal lesions when chewing tobacco ($P < 0.05$) (Table 1).

The results indicated that the prevalence of erythematous mucosal lesions in people with and without a family history of oral lesions was 12.5% (3) and 6.2% (23), respectively. Based on the results of the 2D chi-square test, there was no significant relationship with the family history of oral lesions in people who used chewing tobacco ($P > 0.05$) (Table 1).

The prevalence of erythematous mucosal lesions was estimated to be 9.4% (12) in smokers and 5.2% (14) in non-smokers. Therefore, there was a significant relationship between the prevalence of erythematous mucosal lesions and alcohol consumption ($P < 0.05$) (Table 1).

According to the obtained data, the prevalence of erythematous mucosal lesions was 19% (19) and 2.4% (7) in alcoholics and non-alcoholics, respectively (Table 1).

A 2D chi-square test was used to test the hypothesis that “the frequency of erythematous mucosal lesions is related to alcohol consumption”; the test results demonstrated that people who drink alcohol are more likely to develop erythematous mucosal lesions than people who do not.

The highest prevalence of mucosal lesions in the group of people with a history of chewing tobacco use for more than five years was 13.7% (7), and the lowest prevalence of mucosal lesions in the group of individuals with a history of less than one year of consumption was equal to 1.3% (2). After using a 2D chi-square test, it was revealed that as the duration of use increases, the probability of developing erythematous mucosal lesions increases in people consuming chewing tobacco ($P < 0.05$) (Table 1).

**Discussion**

In our study, there was a significant relationship between the prevalence of tobacco pouch mucosal lesions, white plaque, ulcers, and rhythmic lesions and the duration of tobacco use, thus the prevalence of oral mucosal lesions in people who used tobacco for a prolonged period of time was higher. In the study of Hallikeri et al, a significant relationship was found between the prevalence of oral mucosal lesions and the duration of tobacco use ($P = 0.0001$). As the consumption duration increased, the lesions’ probability demonstrated an increase (10). In the study of Sujatha et al, the prevalence of oral mucosal lesions increased with increasing the duration of use so that in people with a history of more than 15 years of use, more than 80% of changes were observed in their mouth (11).

It is difficult to compare the present study’s findings on the prevalence of oral lesions with the results of other epidemiological studies similar to geographical areas due to the significant differences in the prevalence of oral mucosal lesions in different parts of the world (12). This study’s prevalence differed from the available studies for several reasons such as type, number of times, duration of substance consumption (chewing tobacco), sample size, tobacco, alcoholic beverage consumption, nutritional status, and level of hygiene.

Oral mucosal lesions in people consuming chewing tobacco in the order of prevalence were tobacco pouch (53.2%), wound (10.1%), white plaque lesions (6.6%), and erythematous lesions (6.6%). It is reported that there is a clear correlation between age and the prevalence of oral mucosal lesions (13). The prevalence of oral mucosal lesions is higher in older people than in young people (13, 14). Aging increases the impact of factors affecting the development of oral mucosal lesions such as trauma, diseases, medical treatments, oral hygiene, and dentures (15). In our study, a significant relationship was observed between most lesions and age so that the prevalence of these oral lesions increased with age. The highest prevalence of lesions was related to people over 50 years old, while the lowest prevalence belonged to the range of 10-20 years. Wound lesions alone had no significant relationship with age. In most studies, the prevalence of oral mucosal lesions or most of the classified groups of lesions increased with age.

Likewise, Kamble et al demonstrated a direct relationship between the prevalence of oral mucosal lesions (tobacco pouch and white plaque and erythematous lesions) and age so that the highest and lowest prevalence of lesions was in people over 44 and 17-24 years, respectively (16). Regarding alcohol consumption, in our study, a significant relationship was found between most oral mucosal lesions (tobacco pouch and white plaque of erythematous lesions) and alcohol consumption ($P = 0.004$, $P = 0.004$ $P = 0.000$), thus the prevalence of these lesions increased in people consuming alcohol and alcoholic beverages. Moreover, only significant relationship was not seen between the prevalence of wound mucosal lesions and alcohol ($P = 0.177$). Oral mucosa was enlarged in the
study of Krishna Priya et al (9). The results of studies by Sujatha et al (11) and Cebeci et al (17) concerning alcohol consumption contradict those of our study, and no significant relationship was found between the two variables ($P<0.05$).

The most common lesion in our study was tobacco pouch (52.3%). In the study of Kamble et al, the prevalence of tobacco pouch mucosal lesions was estimated at 24.2%; the reason for the difference in the results was that the inclusion criteria for this study were all smokers and non-smokers (16), while in our study, the inclusion criteria were only non-smokers. In the studies of Naveen-Kumar et al and Sujatha et al, the prevalence of tobacco pouch mucosal lesions in tobacco users was 15% and 16%, respectively, which differed from the results of our study due to different tobacco consumption, as well as duration and number of uses (11, 18). In another study by Sujatha et al, the prevalence of white plaque mucosal lesions (leukoplakia, lichen planus, and oral submucosal fibrous) was estimated to be about 30%, which could be due to the type of tobacco and the sample size in this study (11). In our study, the prevalence of white plaque mucosal lesions was higher in smokers, and there was a significant relationship between the two variables ($P=0.038$, $P=0.047$). However, no significant relationship was found between tobacco pouch mucosal lesions and ulcers with smoking ($P=0.102$, $P=0.096$). In the study of Naveen-Kumar et al, there was a significant relationship between the prevalence of white plaque and arrhythmic lesions ($P=0.000$), thus the prevalence of these lesions was higher in smokers than in chewing tobacco (19).

The prevalence of erythematous lesions in our study was 6.6%. The findings of Kaveri Hallikeri et al are in close conformity with those of our study. The prevalence of erythematous lesions (erythroplakia) was 1% (10).

In the study of Krishna Priya et al, a significant relationship was observed between the prevalence of leukoplakia mucosal lesions and smoking ($P=0.0001$) (9). Cebeci et al also reported a significant relationship between smoking and the prevalence of oral mucosal lesions ($P<0.05$) so that smoking increased the prevalence of oral mucosal lesions (17).

Finally, Al-Mobeeriek and AlDosari (19) found no significant relationship between smoking and the prevalence of oral mucosal lesions ($P<0.05$).

**Conclusion**

In this study, due to the level of culture and the very low prevalence of chewing tobacco among women, the patients were selected from men; therefore, we could not have a gender variable in the current study, which could be counted as the limitation of this study.

Based on the results of this study and their comparison with those of other similar studies, it is concluded that oral mucosal lesions are highly prevalent in tobacco users in Hormozgan province. With age, people are more likely to develop oral mucosal lesions, and the duration of chewing tobacco use is a severe risk factor for the lesion.

**Authors’ Contributions**

RR and MM contributed to the design of the study, revised and approved the final draft of the manuscript. AA contributed with data acquisition and data analysis, revised and approved the final draft of the manuscript. MS, AS and MV wrote the manuscript, revised and approved the final draft of the manuscript.

**Conflict of Interest Disclosures**

The authors declare no competing interests.

**Ethical Statement**

The Ethics Committee of Hormozgan University of Medical Sciences approved the study under the ethical code IR.HUMS.REC.1398.006. Patients were examined after mentioning the use of chewing tobacco with their consent.

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