Assessment of Nicotine Dependence Using Fagerstrom Test among Patients with Leukoplakia and Oral Submucous Fibrosis

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Authors' contributions

This work was carried out in collaboration between both authors. Author NP contributed acquisition of data, analysis, literature collection and also in drafting the article and revising it critically for important intellectual content. Author SD contributed in conception, the study design, Interpretation of data, formatting, manuscript preparation, supervision and guidance. Both authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Tobacco consumption has an influence on the oral mucosa and causes oral malignancy in the due time. On assessing nicotine dependence, appropriate counselling can be given to prevent further progression of the habit. Aim of this study was to assess the nicotine dependence levels among patients with potentially malignant disorders such as leukoplakia and Oral Submucous Fibrosis (OSMF) using fagerstrom test. This study included 140 patients from October 2019 to January 2020 in a dental hospital. Variables such as age, gender, tobacco form and lesion were assessed. Descriptive and chi square statistics were performed. Out of 140 patients, higher prevalence with tobacco usage were among 41-50 years (40%), 94.29% were males and 5.71% were females, 16.43% had low dependency, 52.86% had medium dependency and 30.71% had high dependency. Association between age; nicotine dependency in patients with and without lesion

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p=0.000(p<0.05), statistically significant. Association between gender and patients with and without lesions p=0.151(p>0.05), statistically not significant. Within the limitations of the present study, males had higher prevalence of tobacco use among 41-50 years. Patients with potentially malignant disorders and smokers without lesion had medium dependence while smokeless tobacco users without lesion had a high dependence.

Keywords: Tobacco; nicotine dependence; leukoplakia; oral submucous fibroses; fagerstrom test.

1. INTRODUCTION

Oral lesions such as leukoplakia and oral submucous fibrosis have an increased potential to transform into malignancy. They are highly associated with tobacco usage. Oral cancer ranks the third amongst all cancers in India. The habit of using tobacco in all forms has a significant influence in the oral cavity [1,2].

Tobacco is mainly derived from plant sources such as Nicotiana tabacum and Nicotiana rustica. Nicotine is mainly responsible for the hazards caused by tobacco usage and responsible for the addiction. It is a very potential stimulant drug as it mainly affects the central nervous system. This causes addiction, affecting almost all the organs of the human system. Inspite nicotine, there are several other chemicals in combination with nicotine that have a hazardous potential. Tobacco is consumed as smoke, smokeless forms or combination of both which are found to be highly carcinogenic on regular use. Smoke tobacco forms are cigarettes, beedi, and cigars and smokeless forms are betel nut and gutka. Compared to smoked tobaccos, smokeless tobaccos have comparatively higher nitrosamine content, a potent carcinogen [3,4].

Previous literature has reported that nicotine dependence itself, independent of the amount of smoking, is a strong factor for several major causes of mortality from tobacco-related diseases. Hence, early diagnosis, management, and providing tobacco cessation interventions are an essential need for better prognosis and to decrease the morbidity and mortality from the disease. Therefore, classifying the patients receiving treatment based on their tobacco use and their nicotine dependence levels by fagerstrom test is necessary. Tobacco cessation interventions should be provided in the health settings which motivates an individual to change his or her health behavior [5,6].

Various lesions in the oral cavity are associated with tobacco usage ranging from initial mucosal changes to full blown oral cancer and these changes are in turn dependent on various forms of tobacco usage. [7,8]They may present as tooth stains, smoker's melanosis, keratotic patches, black hairy tongue, nicotinic stomatitis, palatal erosions, leukoplakia, oral submucous fibrosis, epithelial dysplasia and squamous-cell carcinoma are other tobacco associated lesions. [9,10] A thorough intraoral examination at regular intervals by a dental health professional will help to recognize these lesions at an early stage and prevent their serious sequelae by an early intervention.

Anti tobacco counselling is one of the important aids in the habit cessation among the tobacco users. There are various pharmacotherapies and behavioral modification in the cessation counselling. The utilization of the appropriate mode of treatment is necessary for the individual to discontinue the habit and further prevent them from addiction.[1,11] To analyze the patient's mental status and the desire to quit the habit, the professional should have knowledge on the nicotine dependency levels , tobacco forms used and the reason for their habit. By regular counselling there are higher chances for individuals to quit the habit and transform the quality of life to a better living. Early intervention also prevents the transformation of potentially malignant disorders into malignancy.

Our recent research portfolio of slides contains numerous articles in reputed journals [12–16]. Based on this experience we planned to pursue the nicotine dependence using fagerstrom test among patients with potentially malignant disorders.

2. MATERIALS AND METHODS

2.1 Study Setting and Study Design

This study was conducted to determine the nicotine dependence among patients with potentially malignant disorders reporting to Saveetha dental college and hospital during the month from October 2019 to January 2020.

2.2 Sampling

A total of 140 patients visiting the dental hospital were assessed by a thorough clinical examination and were classified into control and study groups. In the study group, 35 patients had leukoplakia and 35 patients had OSMF. In the control group, 35 patients had smoking habits without any mucosal lesions and 35 patients had smokeless tobacco usage without any lesions. Patients were given anti tobacco counselling and their nicotine dependence levels were assessed through Fagerstrom nicotine dependence scale. Only those patients who underwent anti tobacco counselling were included into the study. Patients who were not willing for the cessation were excluded from the study.

2.3 Data Collection

The patients were classified into control and the study groups. Relevant factors such as nicotine dependency, use of different tobacco forms were analysed. Demographic details such as age, gender were also recorded.

2.4 Statistical Analysis

The collected data was validated, tabulated and analysed with Statistical Package for social sciences for windows, IBM SPSS version 20.0

and results were obtained. Categorical variables were expressed in frequency and percentage. Chi square tests were employed to test associations between categorical variables with a level of significance set at $p < 0.05$.

3. RESULTS

In the present study, out of 140 patients, 13 patients (9.29%) were under 21-30 years, 29 patients (20.71%) were under 31-40 years, 56 patients (40%) were under 41-50 years, 42 patients (30%) were under 51-60 years. The higher prevalence of patients with tobacco usage were seen among 41-50 years age groups (40%) and least prevalence were seen among 21-30 years (9.29%).[Fig. 1].

In the present study, out of 140 patients, 132 patients were males (94.29%) and 8 patients were females (5.71%). The higher prevalence of patients with tobacco usage was among males than females. [Fig. 2].

In the present study, the level of nicotine dependency was assessed among different types of tobacco users. Out of 140 patients, 23 patients (16.43%) had low dependency, 74 patients (52.86%) had medium dependency and 43 patients (30.71%) had high dependence. The patients had higher prevalence of medium dependence [Fig. 3].
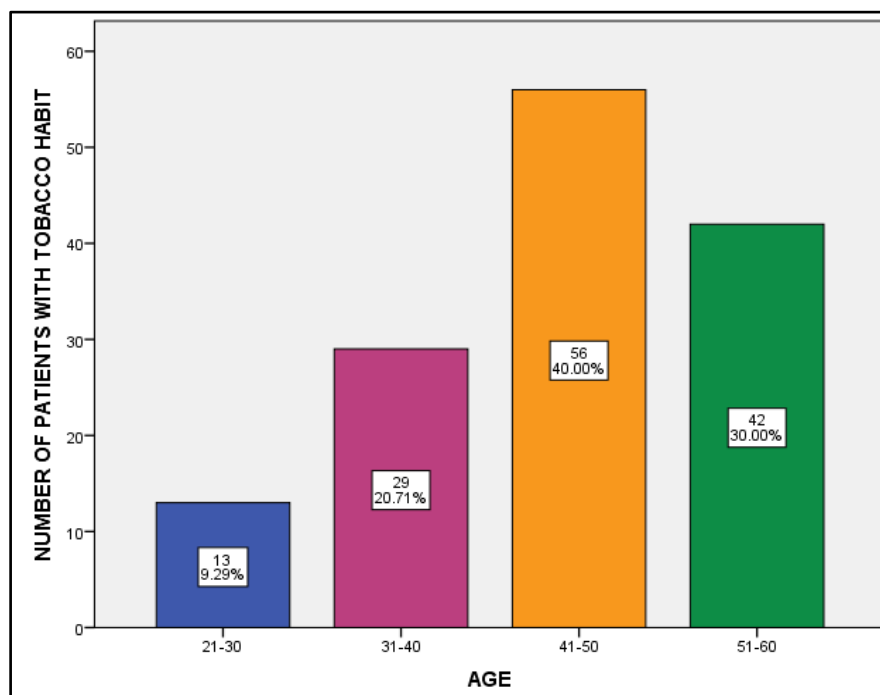

Fig. 1. Bar graph depicting the age wise distribution of patients with tobacco usage
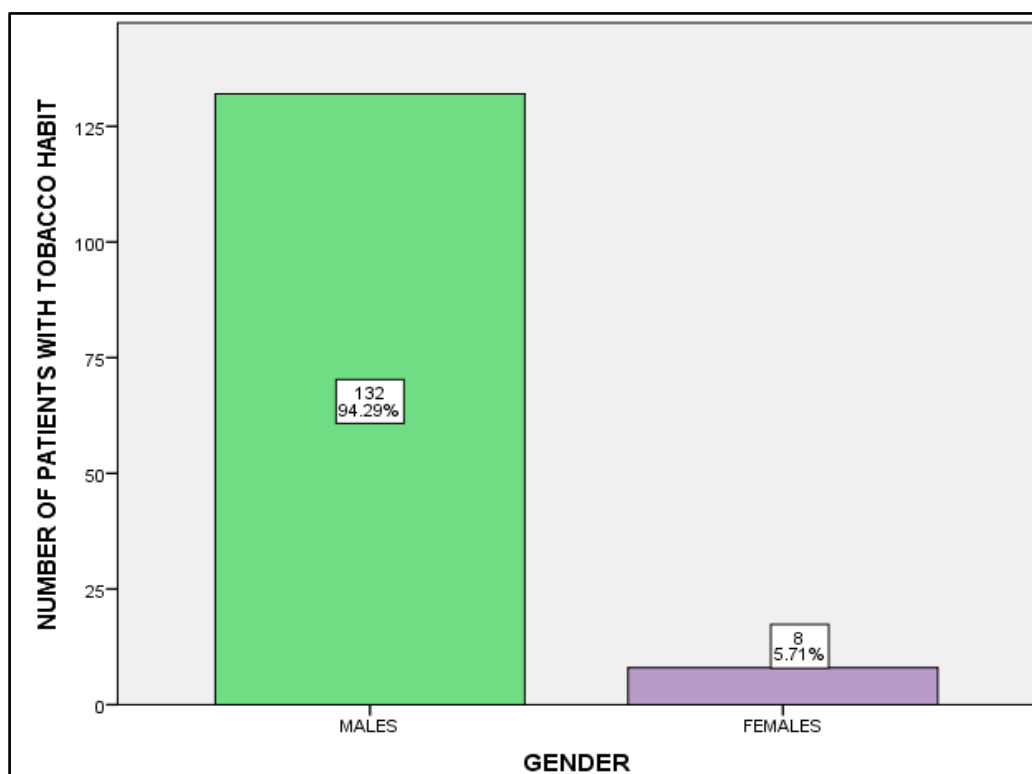
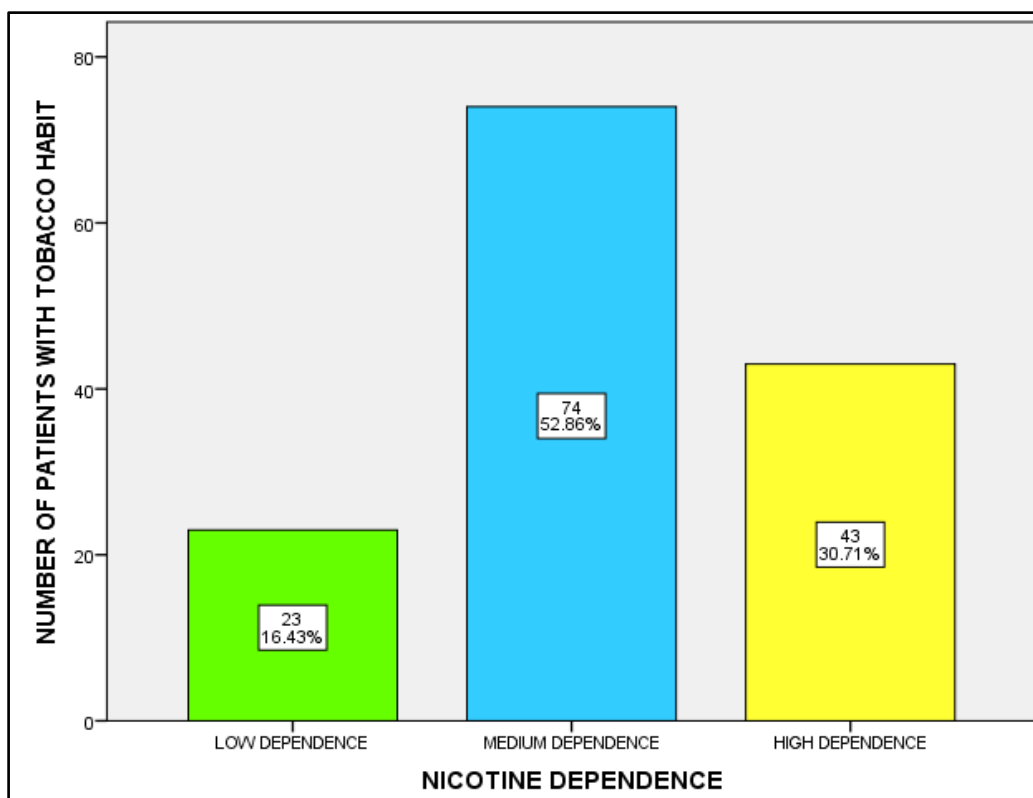**Fig. 2. Bar graph depicting the gender wise distribution of patients with tobacco usage**

Fig. 3. Bar graph depicting the nicotine dependence distribution of patients with tobacco usage

Table 1. The frequency and percentage distribution of patients having tobacco habit with and without lesions among different age groups

Tobacco usage patients with and without lesions	Age				Total
	21-30	31-40	41-50	51-60	
Leukoplakia	0 (0%)	4 (2.8%)	15 (10.7%)	16 (11.4%)	35 (25%)
OSMF	0 (0%)	4 (2.8%)	13 (9.3%)	18 (12.8%)	35 (25%)
Smoking without lesion	2 (1.4%)	11 (7.9%)	14 (10%)	8 (5.7%)	35 (25%)
Smokeless without lesion	11 (7.9%)	10 (7.1%)	14 (10%)	0 (0%)	35 (25%)
Total	13 (9.3%)	29 (20.7%)	56 (40%)	42 (30%)	140 (100%)

Table 2. The chi square analysis shows the association between patients with and without lesions and different age groups

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	50.834[a]	9	<0.05
Likelihood Ratio	59.644	9	<0.05
N of Valid Cases	140		

On analyzing the association between age groups and patients with and without lesions, among 35 leukoplakia patients, 4 patients (2.86%) were under 31-40 years, 15 patients (10.71%) were under 41-50 years, 16 patients (11.43%) were under 51-60 years. Among 35 patients with OSMF, 4 patients (2.86%) were under 31-40 years, 13 patients (9.29%) were under 41-50 years, 18 patients (12.86%) were under 51-60 years. Among smoking patients without any lesions, 2 patients (1.43%) were under 21-30 years, 11 patients (7.86%) were under 31-40 years, 14 patients (10%) were under 41-50 years, 8 patients (5.71%) were under 51-60 years. Among smokeless tobacco patients without lesions , 11 patients (7.86%) were under 21-30 years, 10 patients (7.14%) were under 31-40 years, 14 patients (10%) were under 51-60 years. There was a higher prevalence of leukoplakia among 51-60 years (11.43%). There was a higher prevalence of OSMF among 51-60 years (12.86%). There was a higher prevalence of smoking and smokeless tobacco patients seen among 41-50 years age groups (10%)both each respectively.[Table 1, Fig. 4] On chi square analysis, there was a significant association between age and tobacco usage patients with and without lesion , p value<0.05. [Table 2].

On analysing the association between gender and tobacco consuming patients with and without lesion, among 35 patients with leukoplakia, 34 patients (24.29%) were males and one patient (0.71%) were females. Among 35 patients with

OSMF, 32 patients (22.86%) were males, 3 patients (2.14%) were females. Among 35 patients having smoking habits without lesions, all were males (25%) and among smokeless tobacco patients without lesions, 31 patients were males (22.14%) and 4 patients were females (2.86%). Males were in a higher prevalence among patients with and without lesion [Table 3, Fig. 5]. There was no significant association between gender and tobacco consuming patients with and without lesions [Table 4].

On analyzing the patients with and without lesions and their nicotine dependency levels, among 35 patients with leukoplakia, 8 patients (5.71%) had low dependence, 16 patients (11.43%) had medium dependence, 11 patients (7.86%) had high dependence. Among 35 patients with OSMF, 2 patients (1.43%) had low dependence, 21 patients (15%) had medium dependence, 12 patients (8.57%) had high dependence. Among 35 smoking patients without lesions, 8 patients (5.71%) had low dependence and 27 patients (19.29%) had medium dependence. Among 35 smokeless tobacco usage patients, 5 patients (3.57%) had low dependence, 10 patients (7.14%) had medium dependence and 20 patients (14.29%) had high dependence. Among 140 patients, 74 patients had medium dependence [Table 5, Fig. 6]. There was significant association between the nicotine dependency and the patients with and without lesions, p value<0.05 [Table 6].
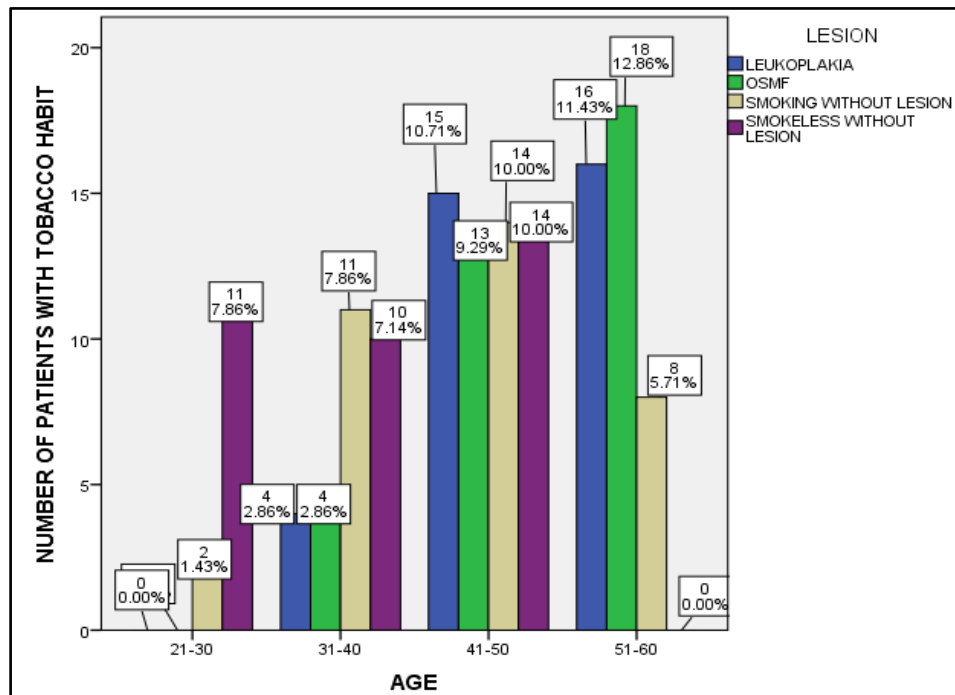
Fig. 4. Bar graph depicting the association between patients with and without lesion and different age groups

Table 3. The frequency and percentage distribution of patients having tobacco habit with and without lesion among gender

Tobacco consuming patients with and without lesions	Gender		Total
	Males	**Females**	
Leukoplakia	34 (24.2%)	1 (0.7%)	35 (25%)
OSMF	32 (22.8%)	3 (2.1%)	35 (25%)
Smoking without lesion	35 (25%)	0 (0%)	35(25%)
Smokeless without lesion	31 (22.1%)	4 (2.8%)	35 (25%)
Total	132 (94.2%)	8 (5.7)	140 (100%)

Table 4. The chi square analysis shows the association between patients having tobacco habit with and without lesion among gender

Chi-Square Tests			
	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	5.303[a]	3	.151
Likelihood Ratio	6.895	3	.075
N of Valid Cases	140		

Table 5. The frequency and percentage distribution of nicotine dependence levels among patients with and without lesion

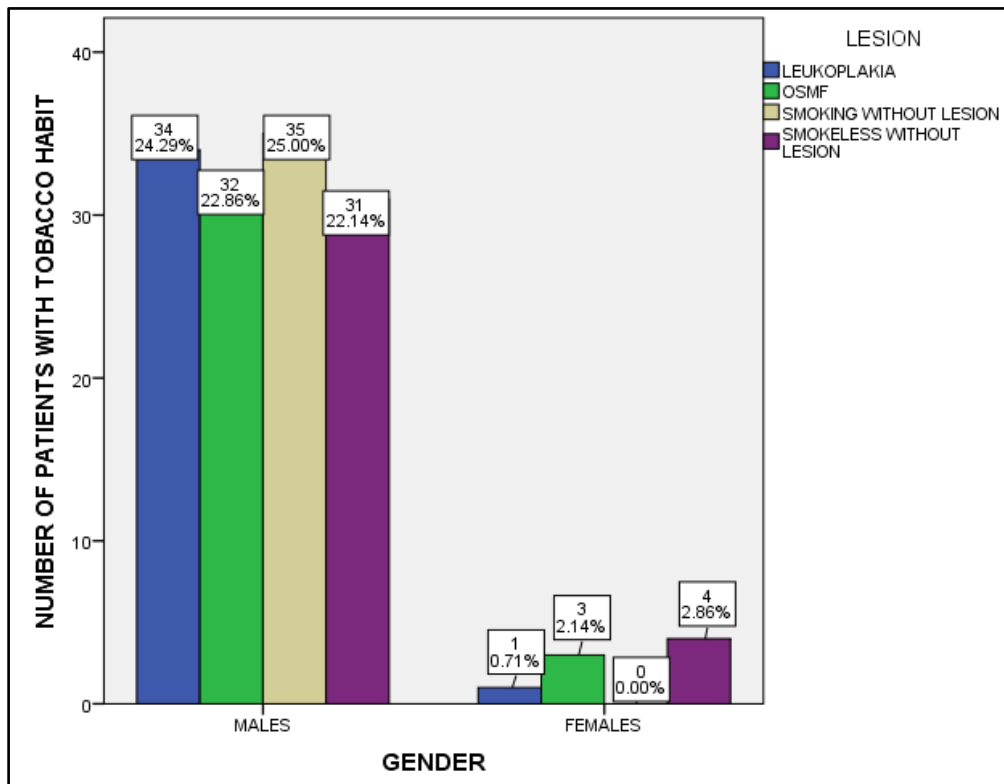| Tobacco consuming patients with and without lesions	Nicotine dependence			Total
	Low dependence	**Medium dependence**	**High dependence**	
Leukoplakia	8 (5.7%)	16 (11.4%)	11 (7.8%)	35 (25%)
OSMF	2 (1.4%)	21 (15%)	12 (8.5%)	35 (25%)
Smoking without lesion	8 (5.7%)	27 (19.2%)	0 (0%)	35 (25%)
Smokeless without lesion	5 (3.6%)	10 (7.1%)	20 (14.2%)	35(25%)
Total	23 (16.4%)	74 (5.2%)	43 (30.7%)	140 (100%)

Fig. 5. Bar graph depicting the association between patients with and without lesion among gender
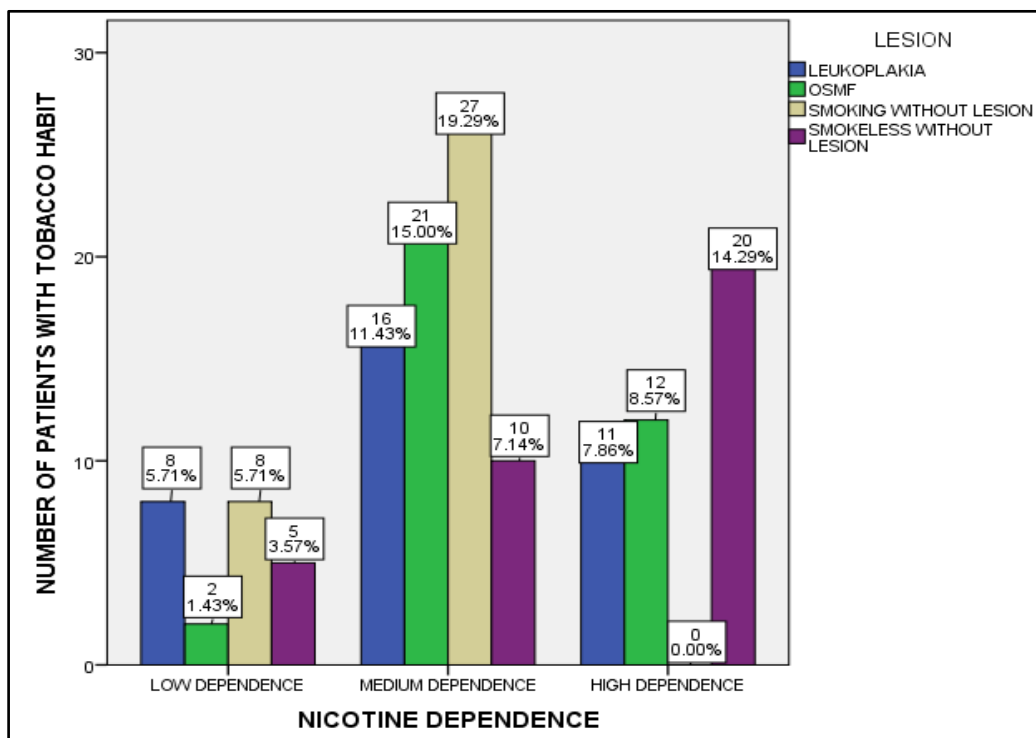

Fig. 6. Bar graph depicting the association between patients with and without lesion and nicotine dependency levels

Table 6. The chi square analysis showed the association of nicotine dependence levels among patients with and without lesions

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	31.651[a]	6	<0.05
Likelihood Ratio	41.714	6	<0.05
N of Valid Cases	140		

4. DISCUSSION

In the present study, there was higher prevalence of patients with tobacco use were seen among 41- 50 years followed by 51-60 years age groups. Study done by koothati et al have showed a higher prevalence of tobacco usage among 36-55 years. [17].Study done among school children have shown higher prevalence of tobacco was seen at a mean age of 12.4 years [18] and study done among older adults have shown higher prevalence among 75-80 years age groups [19]. Our study findings of higher prevalence among 41-60 years are in contrast with the previous study. The possible reason would be the variation in the culture, geographic location and age groups.

In the present study, males had higher prevalence of tobacco use than females and also males had higher prevalence in all forms of tobacco use with and without lesion. Previous studies have shown a male predominance with tobacco use.[1,9,20]. Our study findings that males had higher prevalence are in accordance with the present study.

In the present study, there was a higher prevalence of medium dependence among patients with tobacco usage. Previous studies have shown a higher prevalence of medium dependence [3,6,21] which is in accordance with the present study.

In the present study, leukoplakia and OSMF was higher among 51-60 years, smoking and smokeless patients without lesions were higher among 41-50 years age groups. Previous studies have shown prevalence of leukoplakia and OSMF among 41-60 years aged patients with tobacco habits.[7,10,20].Our study findings that potentially malignant disorders are higher among 51-60 years are in accordance with the present study.

In the present study, there was higher prevalence of medium nicotine dependence among leukoplakia. OSMF and smoking patients without lesions while there was a higher prevalence of smokeless tobacco forms with high dependence. Previous studies have shown different nicotine levels among smokers and smokeless forms of tobacco users. [5,20,22]. Our study findings have shown potentially malignant disorders had medium dependence which are in contrast with the previous study. The variation could be the ethnicity, culture and the use of tobacco forms differs among individuals and specific regions.

In the present study, males had higher prevalence of tobacco use among 41-50 years. Patients had medium dependence with leukoplakia, OSMF and among smoking patients without lesions. Among smokeless tobacco users there was a higher prevalence of high dependence.

5. LIMITATION OF THE STUDY

The limitation of the present study would be the smaller sample size which cannot be generalized to a population. The study included the patients with potentially malignant disorders and those who have undergone anti tobacco counselling. There was a prevalence of medium dependence among patients with potentially malignant disorders. Due to the presence of lesions, there is a chance of patients to reduce their tobacco consumption in relation to previous years. This could have been the reason for the variation in nicotine dependence levels among the patients in our study. Lack of awareness among smokeless tobacco users and cost effectiveness, with maximum contact time of the tobacco could have been the reason for high dependency levels when compared to smokers. Therefore further research on a larger sample size can be done and also the various associated factors can be assessed.

6. CONCLUSION

Within the limitations of the present study, males had higher prevalence of tobacco use among 41-50 years. Patients with potentially malignant

disorders and patients with smoking habit without lesion had medium dependence while smokeless tobacco users had a high dependence. Younger patients also showed a prevalence of tobacco habits though higher prevalence was seen in older age groups.

CONSENT AND ETHICAL APPROVAL

Informed consent from the patients were retrieved. The study was initiated after approval from the Institutional ethical committee.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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