

ASSOCIATION BETWEEN ORAL LEUKOPLAKIA SMOKING AND ALCOHOL HABITS IN PATIENTS

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ABSTRACT

Oral leukoplakia is seen as a predominant white patch in the oral mucosa and is the most common potentially malignant disorder of the oral mucosa. Habits such as tobacco, betel nut chewing and alcohol increases the incidence of oral leukoplakia. This study was aimed to evaluate the association of oral leukoplakia in patients having smoking and alcohol habits. In this study, patients having oral leukoplakia were sorted out by reviewing and analysing 86,000 patients records who visited the private dental college during the time period of June 2019 to March 2020. The personal history with habits such as smoking and alcohol were also recorded. A Chi-square test was used to determine association between variables to obtain the results. In our study, we found that the males showed higher prevalence of Oral Leukoplakia than females. A statistically significant result was found in patients between 41-50 years of age (29.2%) with smoking habits (84.8%) and alcohol intake habits (51%). It also showed that there was stronger association between oral leukoplakia and patients with both smoking and alcohol habits, than in patients having alcohol habit alone.

Keywords: Alcohol, Oral Cancer, Oral Leukoplakia, Potentially Malignant Disorder, Tobacco.

INTRODUCTION

Oral cancer is a major health problem in India. The term potentially malignant disorder refers to both “Premalignant lesion” and “Premalignant Condition”. The premalignant lesion is defined as “a morphologically reformed tissue in which oral cancer is more likely to occur than in its seemingly normal counterpart.” An example of premalignant lesions is oral leukoplakia. Premalignant lesions are now redescribed as Potentially Malignant Disorders (Mohammed and Fairozekhan, 2020).

Oral leukoplakia is the most frequent precancerous lesion seen in the oral cavity (Villa and Woo, 2017). The World Health Organisation (WHO) defined oral leukoplakia as ‘A white patch or plaque that cannot be characterised clinically or pathologically as any other disease.’ Oral leukoplakia is also defined as “Predominantly white lesion of the oral mucosa that cannot be characterised by any other definable lesion” (Lodi and Porter, 2008). The etiopathogenesis of oral leukoplakia could be idiopathic (Axéll et al., 1996; Priyadharsini et al., 2015). The various etiological factors include smoking, alcohol, betel nut chewing,

gutka. Various forms of tobacco were found to be a prime etiological factor for occurrence of leukoplakia. Presence of many carcinogens collectively known as tar which is toxic and carcinogenic are found in tobacco. Multiple and larged sized leukoplakia lesions are seen in smokers. Cessation of smoking either subsided totally or decreased the size of the lesion.

Oral leukoplakia are classified as Homogeneous and Non- Homogenous varieties depending on their appearance. Homogenous leukoplakia appears with a predominant white lesion which is uniform, flat, thin appearance, smooth, wrinkled or corrugated surface throughout the lesion. Whereas Non-Homogenous leukoplakia is a mixture of white and red lesion which appears flat, nodular or verrucous (van der Waal and Axéll, 2002; Kayalvizhi *et al.*, 2016).

Leukoplakia is a lesion with no specific histology and exhibits atrophy or acanthosis. Epithelial dysplasia may or may not be seen in leukoplakia but if epithelial dysplasia changes occur it has a high tendency to transform into a malignant lesion accounting to its variable behavioural pattern. TNM Staging is done to grade the severity of the leukoplakic lesion (Aggarwal, 2018).

The aim of this study was to evaluate the association of oral leukoplakia with associated risk factors like smoking and alcohol in the adult population visiting an University Hospital in Chennai.

MATERIALS AND METHODS

The study was a retrospective study which focused on a university setting. The ethical approval for the current study was obtained from the Institutional Review Board (SDC/SIHEC/2020/DIASDATA/0619-0320). Patients with oral leukoplakia were retrieved by reviewing a total of 86,000 cases of patients who visited private dental colleges during the time period of June 2019 to March 2020. A sample size of 99 leukoplakia cases were obtained. The cases diagnosed as oral leukoplakia were included in the study. The retrieved data which had duplicate records, incomplete diagnosis and were without photographs were excluded from the study. The collected data were recorded and tabulated in the excel sheet. +The data was imported and tabulated in a Statistical Package for Social Science version 17 (SPSS). Descriptive analysis was based on quantitative variables and frequency for categorical variables.

RESULTS AND DISCUSSION

Among 99 data collected on leukoplakia there was male predilection of 94.9% patients with oral leukoplakia compared to females who were only 5.1% (figure 1). From the data collected, patients were categorised based on their age, out of which 29.2% belonged to 41-50 years of age which was the highest followed by 28.2% were in the range of 51-60 years of age, 18.1% were in the range of 31-40 years of age, 12.1% belonged to 61-70 years of age, 8% belonged to 20-30 years of age and 4% belonged to the age group of 71-80 years (figure 2). When assessed on the smoking habit 84.8% admitted that they were smokers whereas 15.1% contradicted the fact they smoke (figure 3). The record on alcohol consumption showed that 51.5% patients admitted that they consumed alcohol whereas 49.4% patients did not have the habit of alcohol intake (figure 4).

From the data collected, 44.44% had both smoking and alcohol habits , 40.40% patients had only smoking habits , 8.08% patients had no habits and 7.07% patients consumed only alcohol (figure 5).

Prevalence of smoking habits among patients with leukoplakia of 41-50 years was observed to be of higher incidence. Analysing through Chi-square test the p value was found to be $0.635 > 0.05$. There was no significant difference between age group and smoking habits (figure 6). Higher incidence in smoking habits among male patients was observed. Analysing through Chi-square test the p value was found to be $0.04 < 0.05$, hence there was a significant difference between gender and smoking habits (figure 8).

Higher incidence in alcohol consumption among patients of 41-50 years was observed. Analysing through Chi-square test the p value was found to be $0.628 > 0.05$. There was no significant difference between age group and alcohol consumption (figure 7). Higher incidence of alcohol consumption among male patients was observed. Analysing through Chi-square test the p value was found to be $0.597 > 0.05$ and was found that no significant difference between gender and alcohol consumption was present (figure 9).

Previously our team had conducted numerous clinical trials (Misra et al., 2015; Steele et al., 2015; Dharman and Muthukrishnan, 2016; Muthukrishnan, Kumar and Ramalingam, 2016; Chaitanya, 2017; Muthukrishnan and Warnakulasuriya, 2018; Patil et al., 2018; Warnakulasuriya and Muthukrishnan, 2018; Subha and Arvind, 2019), survey studies (Subashri and Uma Maheshwari, 2016), case report studies (Choudhury, 2015; Muthukrishnan and Kumar, 2017), radiographic studies (Rohini and Jayanth Kumar, 2017), in-vitro and genetic studies (Venugopal and Maheswari, 2016; Chaitanya et al., 2018; Maheswari et al., 2018) over the past 5 years. Now we are focusing on epidemiological studies. The idea for this study stemmed from the current interest in our community.

Our present study revealed that prevalence of oral leukoplakia was more common in males than in females. It was also noted that oral leukoplakia is the second most common reason for oral cancer in men (Ferlay et al., 2015; Gopinath, Thannikunnath and Neermunda, 2016). In comparison with previous literature, (Lee et al., 2003) stated similar evidence that oral leukoplakia was common in males. In comparison with previous literature not much studies are seen for correlating with female gender predilection. The overall consensus states that most of the articles agree to the fact that oral leukoplakia is more prevalent among males than in females and also varies upon population and their oral habit (Borém and Fritsche-Neto, 2014).

The study revealed that oral leukoplakia was common in the age group of 41-50 years which accounts for 29.2%. This is because of the prevalence of oral habits like smoking at a young age which paves way for the lesion to develop after some years (Mishra et al., 2005). In comparison with previous literature, (Lee et al., 2003) stated a different evidence that leukoplakia was common in the age group of 31-40 years whereas (Hashibe et al., 2000) stated that oral leukoplakia was prevalent in the age group of 55-64 years. In comparison to previous literature, not much studies correlates with the prevalence of oral leukoplakia at 41-50 years of age. The overall consensus is that the age factor can differ for various populations.

The study revealed that oral leukoplakia was common in patients with smoking habits (84.85%). Smoking habits could be a predisposing factor for oral leukoplakia. Smoking contains tobacco products which acts as a major risk factor for the development of oral cancer and other potentially malignant disorders of the mouth (Warnakulasuriya, Sutherland and Scully, 2005). In comparison to previous literature, (Warnakulasuriya, Johnson and Van Der Waal, 2007) stated a similar evidence that oral leukoplakia was more common in smokers than in non-smokers. (Ribeiro et al., 2010) stated a different evidence that Japanese males with high frequency of smoking habit may protect against the relative risk of oral leukoplakia. The overall consensus of most of the articles states that leukoplakia is more common in smokers than in non-smokers.

The study showed that the patients who consumed alcohol alone were also prone to oral leukoplakia. This may be due to the fact that alcohol increases the penetration of carcinogen by increasing the solubility and permeability of the toxins into the oral mucosa (Howie et al., 2001; Maserejian, 2006). The occurrence of leukoplakia in patients who consume only alcohol was found to be an independent factor. However the consumption of alcohol along with other tobacco products have a synergistic effect and is thought to be a causative factor for oral leukoplakia (Abidullah et al., 2014; Carrard and van der Waal, 2017). In comparison with previous literature, (Parlatescu et al., 2014) stated a different evidence that alcohol was thought to be an independent risk factor. In comparison with previous literature not much studies correlate with the idea that consumption of alcohol was significantly associated with leukoplakia. The overall consensus of most articles states alcohol as not an independent factor to promote oral leukoplakia.

LIMITATIONS

The limitation of the study is that it was a single centred study and does not represent ethnic groups.

FUTURE SCOPE

The future scope of the study focuses on the site of the oral leukoplakia lesion, potential degree for transformation of malignancy, further diagnosis and treatment planning.

CONCLUSION

In this study it was observed that oral leukoplakia was more prevalent in males who were in the age category of 41-50 years having a smoking habit or a combination of both smoking and alcohol habits.

Most cancerous lesions arise from potential malignant disorders. Oral leukoplakia is one such disease which affects the patient's quality of life. Management and treatment of the disease is necessary to reduce the disease severity. A proper identification and early diagnosis of oral leukoplakia will ensure proper treatment and plays a key role in saving patient life.

AUTHOR CONTRIBUTIONS

All authors have equally contributed to the research.

CONFLICT OF INTEREST

There are no conflicts of interest.

REFERENCES

- [1] Abidullah, M. et al. (2014) 'Leukoplakia - review of a potentially malignant disorder', *Journal of clinical and diagnostic research: JCDR*, 8(8), pp. ZE01–4.
- [2] Aggarwal, N. (2018) "Leukoplakia- Potentially Malignant Disorder of Oral Cavity -a Review", *Biomedical Journal of Scientific & Technical Research*. doi: 10.26717/bjstr.2018.04.0001126.
- [3] Axéll, T. et al. (1996) 'Oral white lesions with special reference to precancerous and tobacco-related lesions: conclusions of an international symposium held in Uppsala, Sweden, May 18-21 1994. International Collaborative Group on Oral White Lesions', *Journal of oral pathology & medicine: official publication of the International Association of Oral Pathologists and the American Academy of Oral Pathology*, 25(2), pp. 49–54.
- [4] Borém, A. and Fritsche-Neto, R. (2014) *Omics in Plant Breeding*. John Wiley & Sons.
- [5] Carrard, V. C. and van der Waal, I. (2017) 'A clinical diagnosis of oral leukoplakia; A guide for dentists', *Medicina Oral Patología Oral y Cirugía Bucal*, pp. 0–0. doi: 10.4317/medoral.22292.
- [6] Chaitanya, N. C. (2017) 'Role of Vitamin E and Vitamin A in Oral Mucositis Induced by Cancer Chemo/Radiotherapy- A Meta-analysis', *JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH*. doi: 10.7860/jcdr/2017/26845.9905.
- [7] Chaitanya, N. C. et al. (2018) 'An Insight and Update on the Analgesic Properties of Vitamin C', *Journal of pharmacy & bioallied sciences*, 10(3), pp. 119–125.
- [8] Choudhury, P. (2015) 'Vanishing Roots: First Case Report of Idiopathic Multiple Cervico–Apical External Root Resorption', *JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH*. doi: 10.7860/jcdr/2015/11698.5668.

- [9] Dharman, S. and Muthukrishnan, A. (2016) 'Oral mucous membrane pemphigoid - Two case reports with varied clinical presentation', *Journal of Indian Society of Periodontology*, 20(6), pp. 630–634.
- [10] Ferlay, J. et al. (2015) 'Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012', *International Journal of Cancer*, pp. E359–E386. doi: 10.1002/ijc.29210.
- [11] Gopinath, D., Thannikunnath, B. V. and Neermunda, S. F. (2016) 'Prevalence of Carcinomatous Foci in Oral Leukoplakia: A Clinicopathologic Study of 546 Indian Samples', *Journal of clinical and diagnostic research: JCDR*, 10(8), pp. ZC78–83.
- [12] Hashibe, M. et al. (2000) 'Alcohol drinking, body mass index and the risk of oral leukoplakia in an Indian population', *International journal of cancer. Journal international du cancer*, 88(1), pp. 129–134.
- [13] Howie, N. M. et al. (2001) 'Short-term exposure to alcohol increases the permeability of human oral mucosa', *Oral diseases*, 7(6), pp. 349–354.
- [14] Kayalvizhi, E. B. et al. (2016) 'Oral leukoplakia: A review and its update', *Journal of Medicine, Radiology, Pathology and Surgery*, pp. 18–22. doi: 10.15713/ins.jmrps.52.
- [15] Lee, C.-H. et al. (2003) 'The precancer risk of betel quid chewing, tobacco use and alcohol consumption in oral leukoplakia and oral submucous fibrosis in southern Taiwan', *British journal of cancer*, 88(3), pp. 366–372.
- [16] Lodi, G. and Porter, S. (2008) 'Management of potentially malignant disorders: evidence and critique', *Journal of oral pathology & medicine: official publication of the International Association of Oral Pathologists and the American Academy of Oral Pathology*, 37(2), pp. 63–69.
- [17] Maheswari, T. N. U. et al. (2018) 'Salivary micro RNA as a potential biomarker in oral potentially malignant disorders: A systematic review', *Ci ji yi xue za zhi = Tzu-chi medical journal*, 30(2), pp. 55–60.
- [18] Maserejian, N. N. (2006) 'Prospective Study of Alcohol Consumption and Risk of Oral Premalignant Lesions in Men', *Cancer Epidemiology Biomarkers & Prevention*, pp. 774–781. doi: 10.1158/1055-9965.epi-05-0842.
- [19] Mishra, M. et al. (2005) 'Epidemiological and clinicopathological study of oral leukoplakia', *Indian Journal of Dermatology, Venereology and Leprology*, p. 161. doi: 10.4103/0378-6323.16229.
- [20] Misra, S. et al. (2015) 'Metastatic hepatocellular carcinoma in the maxilla and mandible, an extremely rare presentation', *Contemporary Clinical Dentistry*, p. 117. doi: 10.4103/0976-237x.152966.
- [21] Mohammed, F. and Fairozekhan, A. (2020) 'Oral Leukoplakia', *StatPearls*. StatPearls Publishing. Available at: <https://www.statpearls.com/kb/viewarticle/24219> (Accessed: 11 June 2020).
- [22] Muthukrishnan, A. and Kumar, L. B. (2017) 'Actinic cheilosis: early intervention prevents malignant transformation', *BMJ Case Reports*, p. bcr2016218654. doi: 10.1136/bcr-2016-218654.
- [23] Muthukrishnan, A., Kumar, L. B. and Ramalingam, G. (2016) 'Medication-related osteonecrosis of the jaw: a dentist's nightmare', *BMJ Case Reports*, p. bcr2016214626. doi: 10.1136/bcr-2016-214626.
- [24] Muthukrishnan, A. and Warnakulasuriya, S. (2018) 'Oral health consequences of smokeless tobacco use', *The Indian journal of medical research*, 148(1), pp. 35–40.
- [25] Parlatescu, I. et al. (2014) 'Oral leukoplakia - an update', *Maedica*, 9(1), pp. 88–93.

- [26] Patil, S. R. et al. (2018) 'Three-Rooted Mandibular First Molars in a Saudi Arabian Population: A CBCT Study', *Pesquisa Brasileira em Odontopediatria e Clínica Integrada*, p. e4133. doi: 10.4034/pboci.2018.181.87.
- [27] Priyadharsini, C. et al. (2015) 'Leukoplakia: A short review on malignant potential', *Journal of Pharmacy and Bioallied Sciences*, p. 167. doi: 10.4103/0975-7406.155890.
- [28] Ribeiro, A. S. et al. (2010) 'A review of the nonsurgical treatment of oral leukoplakia', *International journal of dentistry*, 2010, p. 186018.
- [29] Rohini, S. and Jayanth Kumar, V. (2017) 'Incidence of dental caries and pericoronitis associated with impacted mandibular third molar-A radiographic study', *Research Journal of Pharmacy and Technology*, p. 1081. doi: 10.5958/0974-360x.2017.00196.2.
- [30] Steele, J. C. et al. (2015) 'World Workshop on Oral Medicine VI: an international validation study of clinical competencies for advanced training in oral medicine', *Oral surgery, oral medicine, oral pathology and oral radiology*, 120(2), pp. 143–51.e7.
- [31] Subashri, A. and Uma Maheshwari, T. N. (2016) 'Knowledge and attitude of oral hygiene practice among dental students', *Research Journal of Pharmacy and Technology*, p. 1840. doi: 10.5958/0974-360x.2016.00375.9.
- [32] Subha, M. and Arvind, M. (2019) 'Role of Magnetic Resonance Imaging in Evaluation of Trigeminal Neuralgia with its Anatomical Correlation', *Biomedical and Pharmacology Journal*, pp. 289–296. doi: 10.13005/bpj/1640.
- [33] Venugopal, A. and Maheswari, T. N. U. (2016) 'Expression of matrix metalloproteinase-9 in oral potentially malignant disorders: A systematic review', *Journal of Oral and Maxillofacial Pathology*, p. 474. doi: 10.4103/0973-029x.190951.
- [34] Villa, A. and Woo, S. B. (2017) 'Leukoplakia-A Diagnostic and Management Algorithm', *Journal of oral and maxillofacial surgery: official journal of the American Association of Oral and Maxillofacial Surgeons*, 75(4), pp. 723–734.
- [35] van der Waal, I. and Axéll, T. (2002) 'Oral leukoplakia: a proposal for uniform reporting', *Oral oncology*, 38(6), pp. 521–526.
- [36] Warnakulasuriya, S., Johnson, N. W. and Van Der Waal, I. (2007) 'Nomenclature and classification of potentially malignant disorders of the oral mucosa', *Journal of Oral Pathology & Medicine*, pp. 575–580. doi: 10.1111/j.1600-0714.2007.00582.x.
- [37] Warnakulasuriya, S. and Muthukrishnan, A. (2018) 'Oral health consequences of smokeless tobacco use', *Indian Journal of Medical Research*, p. 35. doi: 10.4103/ijmr.ijmr_1793_17.
- [38] Warnakulasuriya, S., Sutherland, G. and Scully, C. (2005) 'Tobacco, oral cancer, and treatment of dependence', *Oral oncology*, 41(3), pp. 244–260.

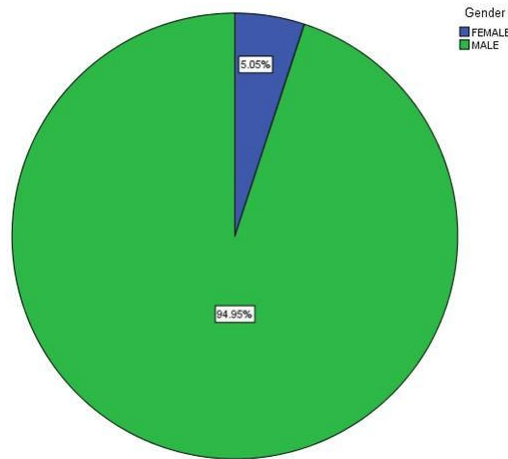


Figure 1: The pie chart depicts the percentage of patients with oral leukoplakia based on gender.. 94.95% patients were male (green) and 5.05% were female (blue).

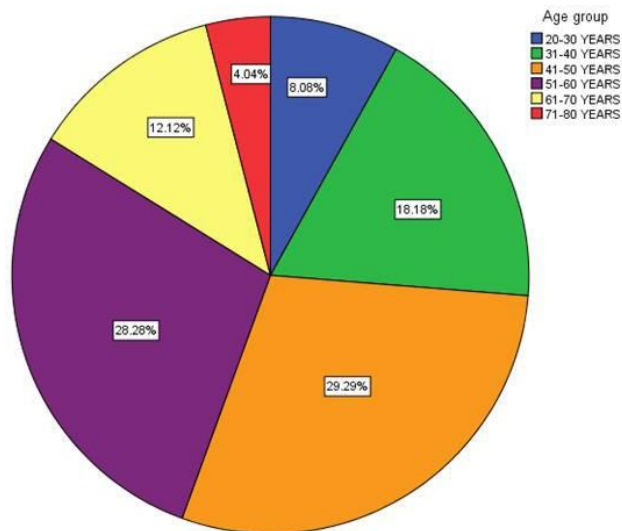


Figure 2: The pie chart depicts the percentage of patients with oral leukoplakia based on age groups. 8.08% belonged to 20-30 years (blue) , 18.18% were 31-40 years (green) , 29.29% were 41-50 years (orange) , 28.28% were 51-60 years (violet), 12.12% were 61-70 years (yellow), 4.04% were 71-80 years (red).

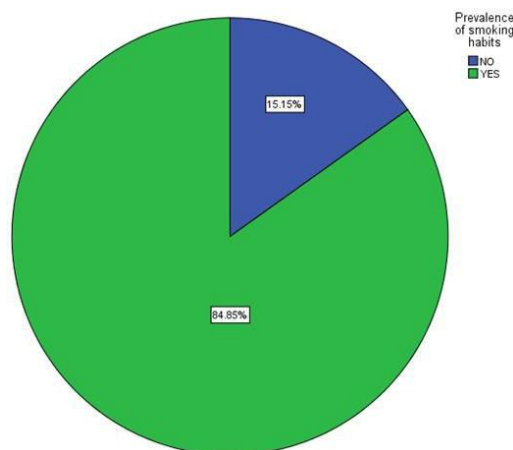


Figure 3: The pie chart depicts the prevalence of smoking habits in patients with oral leukoplakia. 84.85% of patients were smokers (green) and 15.15% were non-smokers (blue).

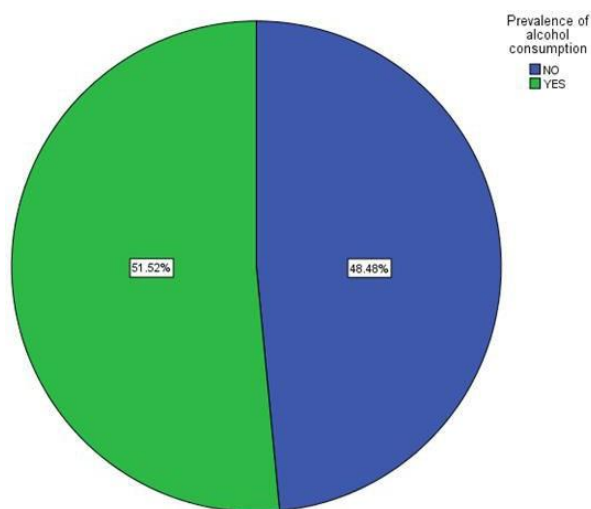


Figure 4: The pie chart depicts the prevalence of alcohol consumption in patients with oral leukoplakia. 51.52% of patients were alcoholic (green) whereas 48.48% patients were non-alcoholic (blue).

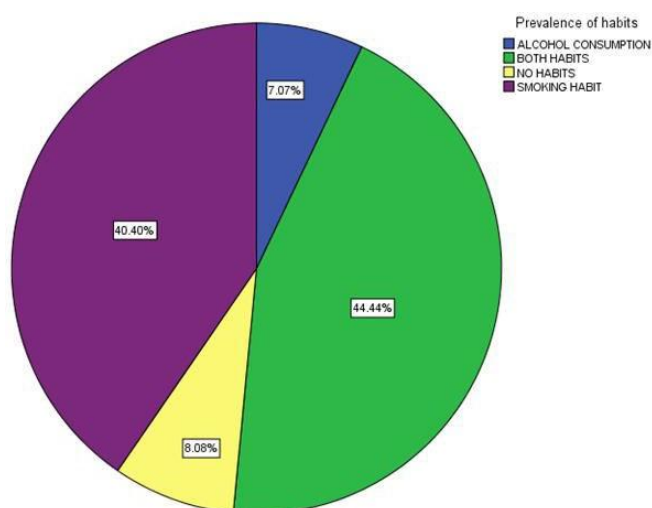


Figure 5: The pie chart depicts the prevalence of habits in patients with oral leukoplakia. 44.44% had both smoking and alcohol habits (green) , 40.40% patients had only smoking habits (violet) , 7.07% patients consumed only alcohol (blue) and 8.08% patients had no habits (yellow).

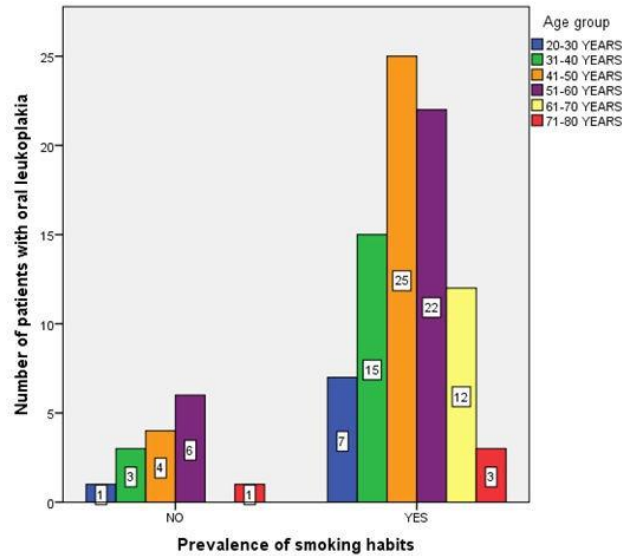


Figure 6: Depicts the association between age group and smoking habits. X-axis represents the distribution of the smoking habits of patients based on age group and Y-axis represents the number of patients with leukoplakia. 20-30 years (blue), 31-40 years (green), 41-50 years (orange), 51-60 years (violet), 61-70 years (yellow), 71-80 years (red). Higher incidence of oral leukoplakia among patients with smoking habits in the age group of 41-50 years was observed (25). Analysing through Chi-square test the p value was found to be $0.635 > 0.05$. There was no significant difference between the smoking habits of patients and the number of patients with oral leukoplakia based on age group.

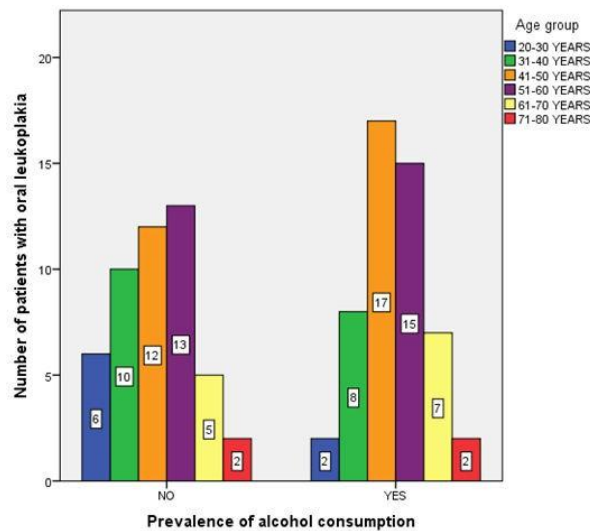


Figure 7: Depicts the association between age group and alcohol consumption. X-axis represents the distribution of alcohol consumption of patients based on age groups and Y-axis represents the number of patients with leukoplakia. 20-30 years (blue), 31-40 years (green), 41-50 years (orange), 51-60 years (violet), 61-70 years (yellow), 71-80 years (red). Higher incidence of oral leukoplakia among patients with alcohol consumption in the age group of 41-50 years was observed (17). Analysing through Chi-square test the p value was found to be $0.628 > 0.05$. There was no significant difference between patients who consume alcohol and the number of patients with oral leukoplakia based on age group.

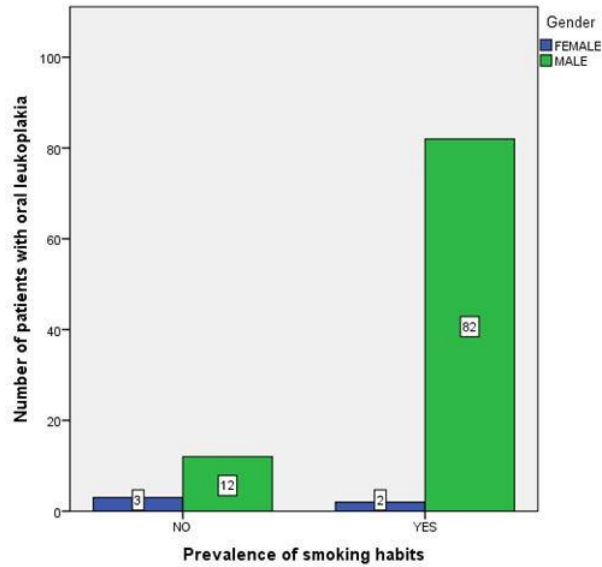


Figure 8: Depicts the association between gender and smoking habits. X-axis represents the distribution of smoking habits of patients based on gender as female (blue), male (green). Y-axis represents the number of patients with leukoplakia. Higher incidence of oral leukoplakia among male patients with smoking habits was observed (82). Analysing through Chi-square test the p value was found to be $0.004 < 0.05$. There was a significant difference between the smoking habits of patients and the number of patients with oral leukoplakia based on gender.

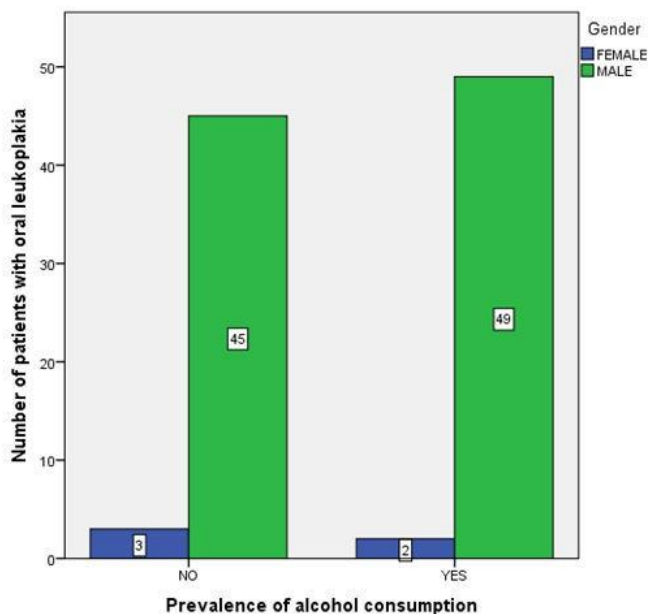


Figure 9: Depicts the association between gender and alcohol consumption. X-axis represents the distribution of alcohol consumption of patients based on gender as female (blue), male (green). Y-axis represents the number of patients with leukoplakia. Higher incidence of oral leukoplakia among male patients with alcohol consumption was observed (49). Analysing through Chi-square test the p value was found to be $0.597 > 0.05$. There was no significant difference between patient's who consume alcohol and the number of patients with oral leukoplakia based on gender.