Journal Bulletin of Stomatology and Maxillofacial Surgery, Vol. 21 № 3

BULLETIN OF STOMATOLOGY AND MAXILLOFACIAL SURGERY
Volume 21, Issue 3

DOI: 10.58240/1829006X-2025.3-259

RESEARCH ARTICLE

PERIODONTAL ASSESSMENT IN PATIENTS WITH ORAL POTENTIALLY MALIGNANT DISORDERS – A RETROSPECTIVE STUDY

Fharreeha Fathima Anees [1], Balaji Ganesh S[1*], Priyadarshini S Saravanakumar[2]

[1]Department of Periodontics, Saveetha Dental College and hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai-600077, Tamil Nadu, India

[2] Assistant Professor, Department of Orthodontics, Sree Balaji Dental College and Hospital, Chennai - 600100,Tamil Nadu, India

*** Corresponding author**: **Dr. Balaji Ganesh. S,** Reader, Department of Periodontics, Saveetha Dental College and hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai-600077, Tamil Nadu, India, Email id: balajiganeshs.sdc@saveetha.com

Received: *Mar. 4, 2025;* ***Accepted:*** *Mar. 27, 2025;* ***Published:*** *Apr. 4, 2025*

ABSTRACT

Background: Periodontal disease is a chronic multifactorial disease while potential malignant disorders are precancerous lesions mostly associated with habits. The aim of the study is to assess the periodontal health in patients diagnosed with oral potentially malignant disorders(PMD) in a private hospital in Chennai, India.

Materials and Methods: The study was a retrospective study and was done under a university setting. Total number of sample size includes 209 patients who have been diagnosed with PMD. The data was obtained from the category of Mucosal lesions, leukoplakia, OSMF, lichen planus , actinic cheilitis and lupus erythematosus. General history including age, sex, adverse oral habits associated and different types of periodontal diseases were tabulated. The data was all tabulated and exported to SPSS for association and analysis using Chi-square test.

Results: There was a significant association found between tobacco usage and periodontal diseases(p=0.038). The association between periodontal diseases and potentially malignant disorders was not statistically significant since p=0.090.

Conclusion: The study concluded that a positive relation is established between smokeless tobacco with generalised chronic gingivitis and smoking tobacco with generalised chronic periodontitis. In patients with leukoplakia and lichen planus, generalized chronic periodontitis was commonly seen. In patients with oral submucous fibrosis, generalised chronic gingivitis was commonly seen. The study also concluded that a possible relationship can be established in a wide scale research between periodontal disease and oral potentially malignant disorders.

Keywords: Actinic Cheilitis; Leukoplakia; Oral Submucous Fibrosis; Periodontal assessment; Potentially Malignant Disorders

INTRODUCTION

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.[1] In accordance with this definition by the According to World Health Organization, periodontal health should be defined as a state free from inflammatory periodontal disease that allows an individual to function normally and not suffer any consequences (mental or physical) as a result of past disease.[2] However, while this definition is holistic and patient outcome based, it seems an impractical and limiting definition for the purposes of clinical management of periodontal diseases. Therefore, a more practical and absolute definition of periodontal health would be a state free from inflammatory periodontal disease. This, in turn, means that absence of inflammation associated with gingivitis or periodontitis, as assessed clinically, is a prerequisite for defining periodontal health. Periodontal disease is the second-most prevalent oral pathology, after dental caries, and has been described among populations of all ages throughout the world.[3]

A wide range of factors has been demonstrated as significantly associated with periodontal disease,including dental plaque, systemic diseases, medications, psychosocial factors and smoking.[4,5]

Many inflammatory biomarkers are also associated with periodontal diseases such as endothelin-1 and tumour necrosis factor which were reported in literature.[6-9]

Potentially Malignant Disorders (PMD) is defined by WHO 2005 as the risk of malignancy being present in a lesion or condition either at time of initial diagnosis or at a future date. No factor has been identified to be the causative factor for potentially malignant disorders. But a number of high risk factors have been put forward which have greater than normal risk of malignancy at a future date.[10,11]

Many etiological factors have been put forward by various authors, some etiological factors are Tobacco, Alcohol-synergistic action along with tobacco, Virus infection(HSV,HPV,EBV,HIV), Bacterial infection(*Treponema pallidum*), Fungal infection(Candida), Electro-galvanic restorative metals, Ultraviolet radiation from sunlight - associated with lip lesions(actinic chelitis), Chronic inflammation or irritation from sharp teeth or chronic cheek-bite (tissue modifiers rather than true carcinogens), Genetic (5% are hereditary), Immunosuppression – organ transplant, HIV, Malnutrition – iron (anemia), vitamin A, B, C deficiency.[12]

Average age of the population affected with PMDs is 50-69yrs, occurring about five years earlier than oral cancer. However recent studies conducted show that 1- 5% of PMDs affect the younger age group of 30 years. This may be due to the fact that various extrinsic and intrinsic etiological factors are now more prevalent in today's younger population.[13] Most common site in the oral cavity for PMDs in India are buccal mucosa followed by tongue, palate and floor of the mouth. Location of PMDs differs from the distribution of OSCC, for which the tongue, alveolar ridge and floor of mouth are the most common sites.[14]

The PMDs considered in this study are leukoplakia, oral submucous fibrosis (OSMF), actinic cheilitis, erosive lichen planus and lupus erythematosus. Leukoplakia - 'The term leukoplakia should be used to recognize white plaques of questionable risk having excluded (other) known diseases or disorders that carry no increased risk for cancer. Furthermore leukoplakia is a clinical term and the lesion has no specific histology.[15]

Oral Submucous Fibrosis - Oral submucous fibrosis (OSMF) is a chronic disorder characterized by fibrosis of the lining mucosa of the upper digestive tract involving the oral cavity, oropharynx and frequently the upper third of the oesophagus.[16]Lichen Planus - Lichen planus is a chronic inflammatory disorder demonstrating some immune pathology.[17] Actinic cheilitis - Actinic cheilitis is considered to represent a potentially malignant condition of the lip .

The squamous epithelium of the lip vermilion may be hyperplastic or atrophic and shows disordered maturation, varying degrees of keratinization, cytological atypia and increased mitotic activity on microscopic examination.[18] Lupus erythematosus - Lupus erythematosus is a chronic autoimmune disease which can be subdivided into three forms; the systemic, drug-induced and discoid. It is the latter benign variant that commonly affects the skin and may involve the mucosal surface of lips and the oral cavity. The disease is driven by an immune complex deposition in affected sites, leading to vasculitis.[19]

No previous articles were present in literature regarding the periodontal status in patients diagnosed with potentially malignant disorders. Studies on prevalence, case reports and periodontal management of leukoplakia, OSMF, Lichen planus, actinic cheilitis and lupus erythematosus were present in the database.[20-23] The idea for this research is stemmed from the current interest in our community and its cultural habits. The study will help in emphasis of periodontal assessment and importance of their assessment in patients diagnosed with PMD of oral cavity. The aim of the study is to assess the periodontal health in patients diagnosed with oral potentially malignant disorders in a private hospital in Chennai, India.

MATERIALS AND METHODS

The study was a retrospective study and was done under a university setting. The study was approved by the scientific review board of the institution. One principal investigator and 2 co-investigators were involved in the study. Total number of sample size includes 209 patients who have been diagnosed with PMD. The case sheets were verified with the help of photographs. The data was obtained from the category of Mucosal lesions, leukoplakia, OSMF, lichen planus , actinic cheilitis and lupus erythematosus. General history including age, sex, adverse oral habits associated and different types of periodontal diseases were tabulated. Data was verified by one external reviewer. If a variant of the particular PMD was not mentioned, the sample was excluded from the study. The data was imported to SPSS and the variables were verified. Chi-square test was done on the data obtained using SPSS software by IBM.

RESULTS

The data collected from the patient management software were tabulated in SPSS and the descriptive statistics were obtained. Out of 209 patients who were taken under study, 88 patients were diagnosed with leukoplakia, 91 patients were diagnosed with OSMF, 28 patients with Erosive lichen planus, 1 patient each under the category of actinic cheilitis and lupus erythematosus (Table1,Graph1).

Table 1.The table shows the frequency and percentage of various potentially malignant disorders included in the study.

POTENTIAL MALIGNANT DISORDERS		
	Frequency	Percentage
Leukoplakia	88	42.1
Lichen Planus	28	13.4
Oral Submucous Fibrosis	91	43.5
Actinic Cheilitis	1	.5
Lupus Erythematosus	1	.5
Total	209	100.0

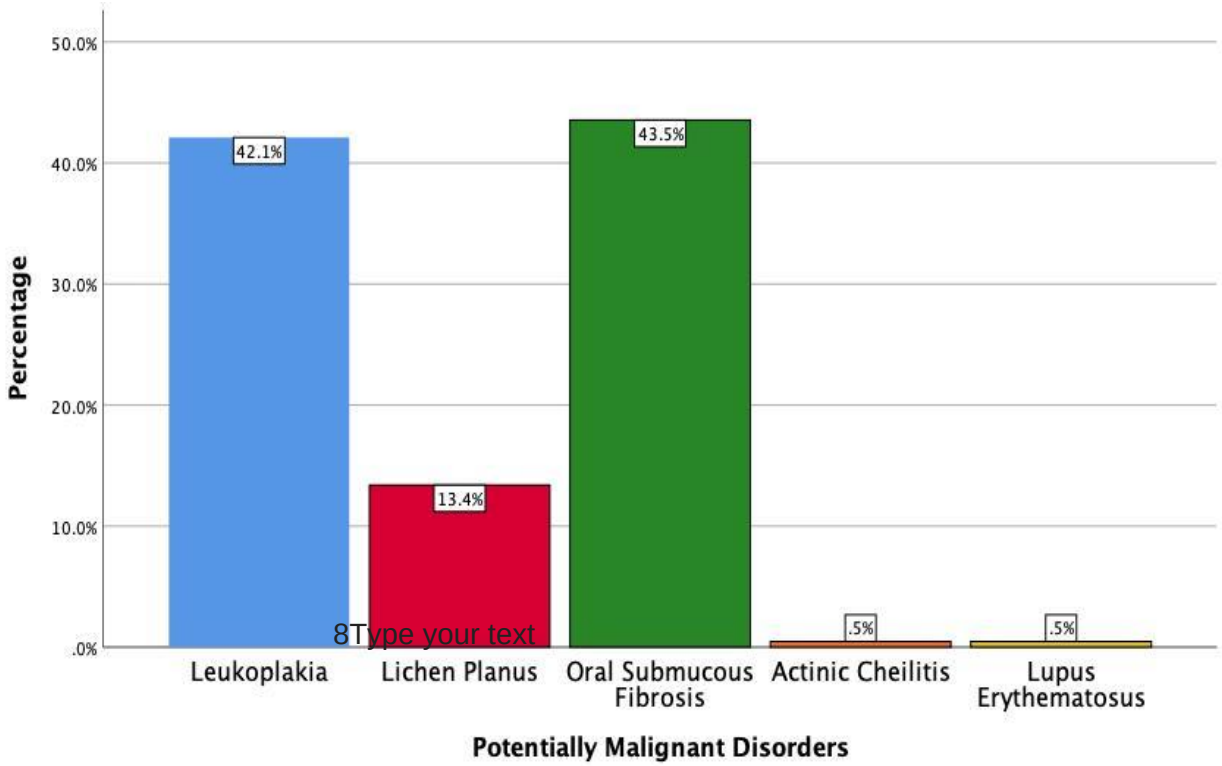

Figure 1. This graph represents the percentage of various potentially malignant disorders involved in the study population, X axis denotes all the potentially malignant disorders in the study and Y axis denotes its percentage, where blue denotes leukoplakia, red denotes lichen planus, green denotes oral submucous fibrosis, orange denotes actinic cheilitis and yellow depicts lupus erythematosus. This graph shows the most common potential malignant disorder involved in the study was oral submucous fibrosis(43.54%).

85 patients were diagnosed with generalised chronic gingivitis, 90 patients were diagnosed with generalised chronic periodontitis, 31 patients were diagnosed with generalised chronic gingivitis with localised periodontitis, 2 patients were diagnosed with localised chronic gingivitis and 1 patients was diagnosed with clinically healthy gingiva under periodontal assessment (Table 2 & Graph 2).

Table 2. This table shows us the frequency and percentage of the periodontal diseases in potentially malignant disorders from the study population.

PERIODONTAL DISEASES		
	Frequency	Percentage
Generalised Chronic Gingivitis	85	40.7
Generalised Chronic Periodontitis	90	43.1
Generalised Chronic Gingivitis with Localised Periodontitis	31	14.8
Localised Chronic Gingivitis	2	1.0
Clinically Healthy Gingiva	1	.5
Total	209	100.0

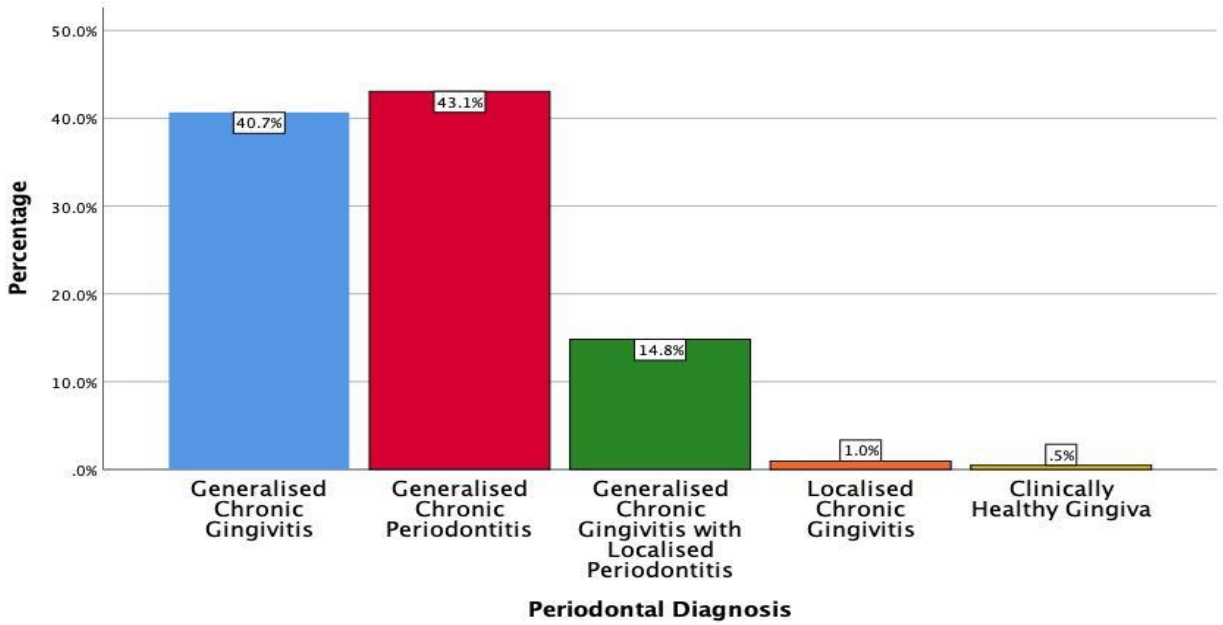

Figure 2. This graph represents the percentage of the periodontal diseases in potentially malignant disorders, X axis depicts the periodontal diseases and Y axis denotes its percentage, where blue denotes generalised chronic gingivitis, red denotes generalised chronic periodontitis, green denotes generalised chronic gingivitis with localised periodontitis, orange denotes localised chronic gingivitis and yellow denoted clinically healthy gingiva. This graph shows that the most commonly seen periodontal disease in potentially malignant disorders was generalised chronic periodontitis(43.06%).

Under the studied population 84 patients claimed to have been using smokeless tobacco, 40 patients were using smoking tobacco, 31 patients used both smoking and smokeless form of tobacco and 54 patients claimed to have no adverse oral habits (Table 3 & Graph 3).

Table 3. The table shows the frequency and percentage of adverse oral habits involved in potentially malignant disorders.

ADVERSE ORAL HABITS		
	Frequency	Percentage
Smoking Tobacco	40	19.1
Smokeless Tobacco	84	40.2
Both	31	14.8
NA	54	25.8
Total	209	100.0

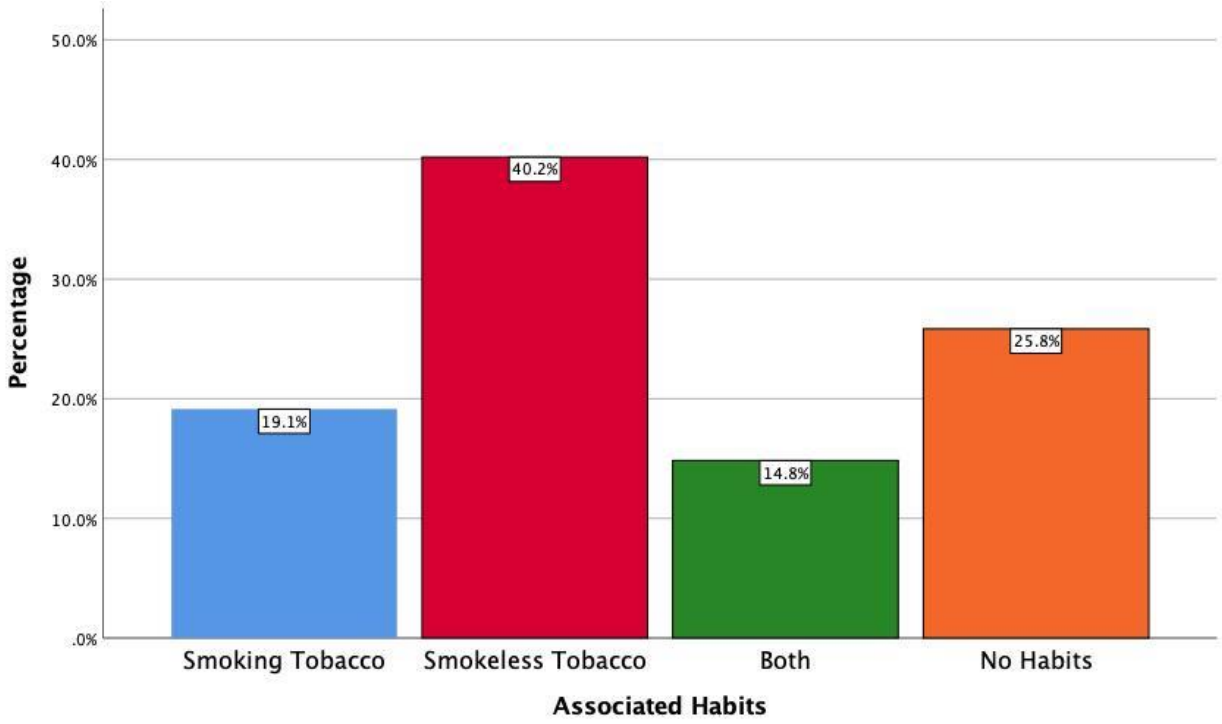

Figure 3. This graph represents the percentage of adverse oral habits in potentially malignant disorders. X axis depicts adverse oral habits among the population and Y axis depicts its percentage, where blue denotes smoking tobacco, red denotes smokeless forms of tobacco, green denotes both smoking and smokeless forms of tobacco and orange denotes no habits associated. This graph shows that the most common habit in the population was the usage of smokeless tobacco(40.19%).

On Chi-square analysis between adverse oral habits and periodontal diseases, it was established that patients using smoking tobacco, both smoking and smokeless tobacco and patients with apparently no adverse oral habits showed high prevalence of generalised chronic periodontitis and patients using smokeless tobacco showed high prevalence of generalised chronic gingivitis.This showed positive association and was significant since p=0.038(Table 4 & Graph 4).

Table 4. This table represents the chi-square analysis between adverse oral habits within the population and periodontal diseases. The association is significant since p=0.038.

Habits-Periodontal Diseases Chi-square Test			
Value		df	Asymptotic significance(2-sided)
Pearson Chi-square	21.968[a]	12	.038
Likelihood Ratio	24.533	12	.017
Linear-by-Linear Association	.129	1	.720
N of Valid Cases	209		

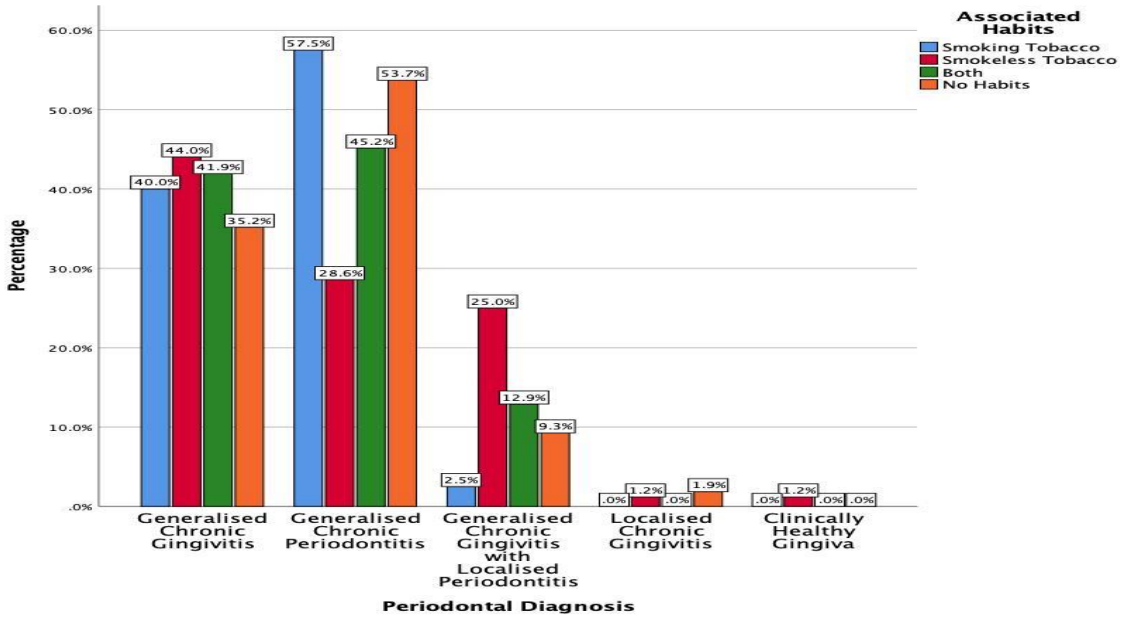

Figure 4. This bar graph represents the association between adverse oral habits and the periodontal diseases in the potentially malignant disorders. X axis denoting the various periodontal diseases and Y axis denoting the percentage of potentially malignant disorder patients.This graph shows generalised chronic periodontitis was mostly seen in patients using smoking tobacco(57.5%) and generalised chronic gingivitis was mostly seen in patients using smokeless tobacco(44%). Association between adverse oral habits and periodontal diseases was done using Chi-square test, Pearson Chi-square is 21.968-p value-0.038($p<0.05$) was found to be statistically significant.

On Chi-square analysis between associated PMDs and periodontal diseases , it was established that patients diagnosed with lupus erythematous and OSMF showed high incidence of generalised chronic gingivitis and patients diagnosed with lichen planus, leukoplakia and actinic cheilitis showed high prevalence of generalised chronic periodontitis. It was not statistically significant since p=0.090 (Table 5 & Graph 5).

Table 5. This table represents the chi-square analysis between potentially malignant disorders within the population and periodontal diseases. The association is non-significant since p=0.090.

Potentially Malignant Disorders*Periodontal Diseases Chi-square Test			
Value		df	Asymptotic significance(2-sided)
Pearson Chi-square	23.978[a]	16	.090
Likelihood Ratio	23.510	16	.061
Linear-by-Linear Association	.029	1	.866
N of Valid Cases	209		

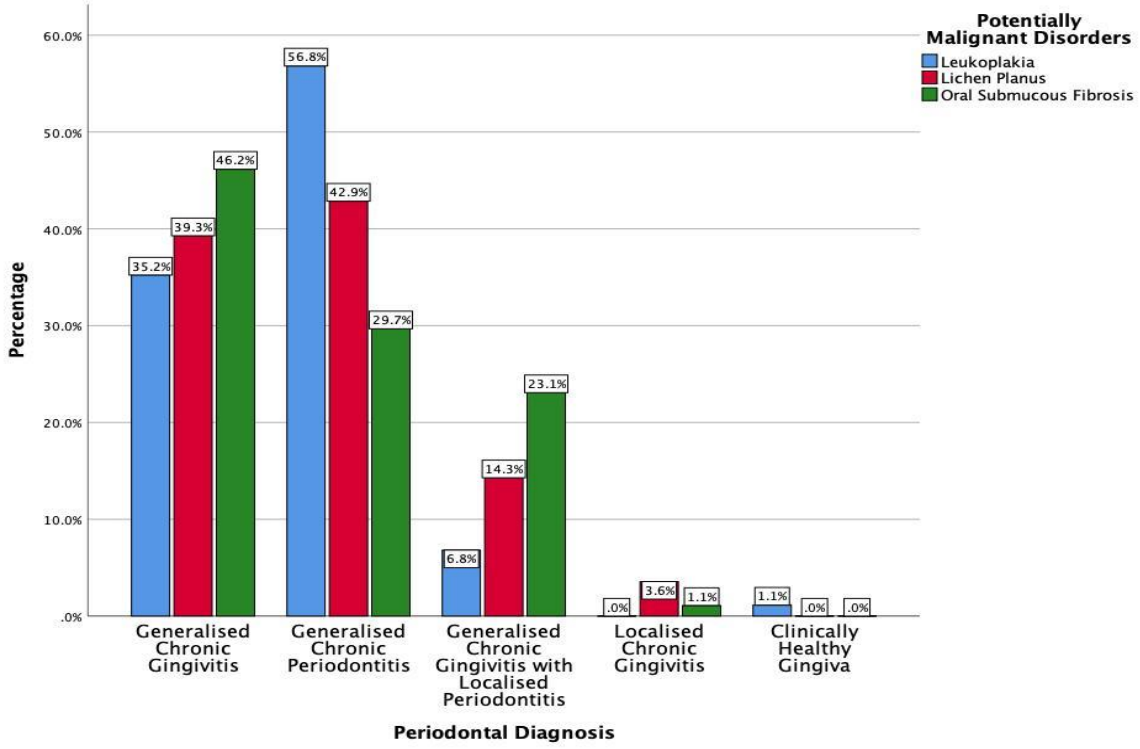

Figure 5. This graph represents the association between potentially malignant disorders and the periodontal diseases in the population, x axis denoting the various periodontal diseases and y axis denoting the percentage of potentially malignant disorders.This graph shows leukoplakia is more among population with generalized chronic periodontitis(56.8%) and oral submucous fibrosis is more among population with generalised chronic gingivitis(46.2%) and generalised chronic gingivitis with localised periodontitis(23.1%). Association between periodontal diseases and potentially malignant disorders was done using Chi-square test, pearson chi-square value is 23.978, p- value- 0.090(p>0.05) was found to be not statistically significant.

DISCUSSION

This study was the first of its kind, to find about the periodontal disease and its association with oral potentially malignant disorders among the chennai population and provides significant new information. A study done by Tezal et al, suggested that there may be a possible relationship between periodontitis and precancerous lesions, which in the present study has been represented with positive association between periodontal diseases and various PMDs involved in the study population.[24] The reason for this similarity is due to the similar sample size of the two studies.

According to the present study, significant association was established between adverse oral habits with the usage of smoking and smokeless tobacco with periodontal diseases, but in contradiction a study conducted by Robertson et al concluded that there was no consistent association between adverse oral habits and periodontal disease.[25] The reason for this difference may be due to the age group of the population involved in the study. Few previous studies suggested a link between dental factors and oral hygiene to oral cancer [26-28] and only three assessed the role of periodontal disease on oral cancer [29-31]. In all three of these studies, measurements of periodontal disease were not quantitative, subjective, or prone to bias. Periodontal disease was represented by self-report of presence or absence of bleeding gums by interview or frequency of bleeding gums by questionnaires.[32]

The association between periodontal disease and oral neoplasm is biologically plausible and may be explained by: 1) broken mucosal barrier in the presence of periodontal disease and consequent enhanced penetration of carcinogens such as tobacco and alcohol. Increased cellularity in blood vessels and connective tissue in chronic inflammation. Conditions such as Lichen Planus, Actinic Cheilitis and Lupus erythematosus can be caused due other etiological factors such as sunlight, genetic or autoimmunity. The most representative limitations of the study was that the patients involved in the study were confirmed cases clinically, to give a more significant relation all the lesions should be confirmed histopathology and their systemic diseases were not recorded. The study was single centered and was done in a population with the same ethnicity and geographic location. To improve the significance of the study, the study should be done extensively with a large amount of sample size, so that the results are reliable.

CLINICAL SIGNIFICANCE: The study helps us to understand the inter-relationship between periodontal diseases and oral potentially malignant disorders as well the adverse oral habits which can provide an indicator in clinical practice.

CONCLUSION

In conclusion, our findings give new hints into the complex inter-relationship between periodontal diseases and oral potentially malignant disorders. The study concluded that a positive relation is established between smokeless tobacco with generalised chronic gingivitis and smoking tobacco with generalised chronic periodontitis. In patients with leukoplakia and lichen planus, generalized chronic periodontitis was commonly seen. In patients with oral submucous fibrosis, generalised chronic gingivitis was commonly seen. Further longitudinal studies are needed to provide evidence of the association between periodontal diseases and oral potentially malignant disorders.

DECLARATIONS

Acknowledgement

The authors would like to acknowledge the help and support rendered by the department of periodontics and also the management of Saveetha Dental College and hospitals for their constant assistance with the research.

Conflict of interest

All the authors declare that there was no conflict of interest in the present study.

Source of funding

The present project is funded by

REFERENCES

1. World Health Organization. *Constitution of the World Health Organization*. CreateSpace Independent Publishing Platform; 2006. 23-24 .

2. Carranza's Clinical Periodontology.Elsevier India; Epidemiology of Gingival and Periodontal Diseases 2013. 64-65.

3. Genco RJ. Current View of Risk Factors for Periodontal Diseases. *Journal of periodontology*. Wiley Online Library; 1996;67;10S: 1041–1049.

4. Thirunavakarasu R, Balaji Ganesh S. Assessment Of Furcation Defects In Diabetic Patients With Chronic Periodontitis-An Institutional Based Retrospective Study. Int J Dentistry Oral Sci. 2021;8(03):1977-83.

5. Pham TA, Ueno M, Shinada K, Kawaguchi Y. Factors affecting oral malodor in periodontitis and

gingivitis patients. Journal of investigative and clinical dentistry. 2012 ;3(4):284-90.

6. Khalid W, Vargheese SS, Lakshmanan R, Sankari M, Jayakumar ND. Role of endothelin-1 in periodontal diseases: A structured review. Indian Journal of Dental Research. 2016;1;27(3):323.

7. Khalid W, Varghese SS, Sankari M, Jayakumar ND. Comparison of Serum Levels of Endothelin-1 in Chronic Periodontitis Patients Before and After Treatment. *Journal of clinical and diagnostic research: JCDR*. 2017;11(4): 78–81.

8. Mootha A, Malaiappan S, Jayakumar ND, Varghese SS, Thomas JT. *The Effect of Periodontitis on Expression of Interleukin-21: A Systematic Review*. International Journal of Inflammation. 2016.1–8. Available from: doi:10.1155/2016/3507503

9. Varghese SS, Thomas H, Jayakumar ND, Sankari M, Lakshmanan R. Estimation of salivary tumor necrosis factor-alpha in chronic and aggressive periodontitis patients. *Contemporary clinical dentistry*. 2015;6(1): 152–156.

10. Krishnan RP, Pandiar D, Ramani P, Jayaraman S. Molecular profiling of oral epithelial dysplasia and oral squamous cell carcinoma using next generation sequencing. J Stomatol Oral Maxillofac Surg. 2024;126(4):102120.

11. David JJ, Kannan B, Pandi C, Jayaseelan VP, Vasagam JM, Arumugam P. Increased SEC14L2 expression is associated with clinicopathological features and worse prognosis in oral squamous cell carcinoma. Odontology. 2024;112(4):1326-1334

12. George A, Sreenivasan BS, Sunil S, Varghese SS, Thomas J, Gopakumar D, et al. Potentially malignant disorders of oral cavity. *Journal of oral and maxillofacial pathology: JOMFP*. academia.edu; 2011;2(1): 95–100.

13. Sankar D, Kannan B, Jayaseelan VP, Manicka Vasagam J, Arumugam P. Alteration in PNMA1 expression is associated with poor prognosis and tumor immune infiltration in head and neck squamous cell carcinoma. J Oral Biol Craniofac Res. 2024 Jan-Feb;14(1):1-7.

14. Diajil A, Robinson CM, Sloan P, Thomson PJ. Clinical outcome following oral potentially malignant disorder treatment: a 100 patient cohort study. International Journal of Dentistry. 2013 Jan 1;2013:1-8.

15. Sridharan G, Ramani P, Patankar S, Vijayaraghavan R. Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma. *Journal of oral pathology & medicine: official publication of the International Association of Oral Pathologists and the American Academy of Oral Pathology*. 2019;48(4): 299–306.

16. Alexander AJ, Ramani P, Sherlin HJ, Gheena S. Quantitative analysis of copper levels in areca nut plantation area - A role in increasing prevalence of oral submucous fibrosis: An in vitro study. *Indian journal of dental research: official publication of Indian Society for Dental Research*. 2019;30(2): 261–266.

17. Boyd AS, Neldner KH. Lichen planus. *Journal of the American Academy of Dermatology*. 1991;25(4): 593–619.

18. Markopoulos A, Albanidou-Farmaki E, Kayavis I. Actinic cheilitis: clinical and pathologic characteristics in 65 cases. *Oral diseases*. 2004;10(4): 212–216.

19. Tan EM, Cohen AS, Fries JF, Masi AT, McShane DJ, Rothfield NF, et al. The 1982 revised criteria for the classification of systemic lupus erythematosus. *Arthritis and rheumatism*. 1982;25(11): 1271–1277.

20. Issrani R, Prabhu N, Keluskar V. Oral proliferative verrucous leukoplakia: A case report with an update. *Contemporary clinical dentistry*. 2013;4(2): 258–262.

21. Wood NH, Khammissa R, Meyerov R, Lemmer J, Feller L. Actinic cheilitis: a case report and a review of the literature. European journal of dentistry. 2011;5(01):101-6.

22. Potasman I, Bassan HM. Multiple tendon rupture in systemic lupus erythematosus: case report and review of the literature. *Annals of the rheumatic diseases*. 1984;43(2): 347–349.

23. Cheng S, Kirtschig G, Cooper S, Thornhill M, Leonardi-Bee J, Murphy R. Interventions for erosive lichen planus affecting mucosal sites. *Cochrane database of systematic reviews* . 2012;(2): CD008092.

24. Tezal M, Grossi SG, Genco RJ. Is periodontitis associated with oral neoplasms? *Journal of periodontology*. 2005;76(3): 406–410.

25. Robertson PB, Walsh M, Greene J, Ernster V, Grady D, Hauck W. Periodontal effects associated with the use of smokeless tobacco. *Journal of periodontology*.1990;61(7):438–443.

26. Velly AM, Franco EL, Schlecht N, Pintos J, Kowalski LP, Oliveira BV, et al. Relationship between dental factors and risk of upper aerodigestive tract cancer. *Oral oncology*. 1998;34(4): 284–291.

27. Zheng TZ, Boyle P, Hu HF, Duan J, Jian PJ, Ma DQ, et al. Dentition, oral hygiene, and risk of oral cancer: a case-control study in Beijing, People's Republic of China. *Cancer causes & control: CCC*. 1990;1(3): 235–241.

28. Albuquerque R, López-López J, Marí-Roig A, Jané-Salas E, Roselló-Llabrés X, Santos JR. Oral tongue squamous cell carcinoma (OTSCC): alcohol and tobacco consumption versus non-consumption. A study in a Portuguese population. *Brazilian dental journal*. 2011;22(6): 517–521.

29. McLaughlin JK, Gridley G, Block G, Winn DM, Preston-Martin S, Schoenberg JB, et al. *Dietary Factors in Oral and Pharyngeal Cancer*. [Online] JNCI Journal of the National Cancer Institute. 1988. p. 1237–1243. Available from: doi:10.1093/jnci/80.15.1237

30. Talamini R, Vaccarella S, Barbone F, Tavani A, La Vecchia C, Herrero R, et al. Oral hygiene, dentition, sexual habits and risk of oral cancer. *British journal of cancer*. 2000;83(9): 1238–1242.

31. Garrote LF, Fernandez Garrote L, Herrero R, Ortiz Reyes RM, Vaccarella S, Lence Anta J, et al. *Risk factors for cancer of the oral cavity and oro-pharynx in Cuba*. [Online] British Journal of Cancer. 2001. p. 46–54. Available from: doi:10.1054/bjoc.2000.1825

32. Harikrishnan R, Raj SS, Balaji Ganesh S. Assessment of Willingness Towards Anti-Tobacco Counseling among Adults using Tobacco-A Retrospective Study. Int J Dentistry Oral Sci. S. 2019 Aug 8;8:26-31.