

Prevalence of Nicotine Stomatitis Among Patients Visiting a Private Dental Hospital - An Institutional Study

Apurva Choudhary¹, Dr. Reshma Poothakulath Krishnan²

¹Undergraduate student, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai- 77, India, Contact number: +91-9304397312

Email: 151801029.sdc@saveetha.com

²Senior Lecturer, Department of Oral Pathology and Microbiology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai- 77, India, Contact number: +91-9445691860

Email: reshmapk.sdc@saveetha.com

Corresponding Author

Dr. Reshma Poothakulath Krishnan

Senior Lecturer, Department of Oral Pathology and Microbiology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai- 77, India, Contact number: +91-9445691860

Email: reshmapk.sdc@saveetha.com

Abstract

Introduction & Background: Nicotine stomatitis, also often referred to as nicotinic stomatitis, is a reaction seen on the roof of the mouth caused by extreme heat in the mouth, most commonly from smoking. It is also known by many other names including nicotinic stomatitis, stomatitis nicotina and smoker's keratosis. This lesion develops due to the concentrated stream of heat released from the tobacco products and the chemicals in tobacco. Aim is to study the prevalence of nicotinic stomatitis among patients visiting a private dental hospital.

Methodology: A retrospective study was conducted involving a dental hospital from July 2020 to March 2021. A total of 40 patients were selected from DIAS based on the inclusion and exclusion criteria. Inclusion criteria were selected based on patients diagnosed with nicotinic stomatitis and exclusion criteria were patients other than nicotinic stomatitis. All available case sheets were reviewed and analyzed in SPSS version 23. **Results:** In this study forty patients were reported with smokers' palate. Data from the current study revealed that 37% of patients that are above 50 years old are more prevalent to smokers' palates. Among them all of them were male. Among the reported cases 37 % of patients gave a history of white patch followed by Hyperkeratinization. Pearson chi square test shows 0.00, (p value < 0.05). Hence, it is statistically significant. **Conclusion:** It can be concluded that prevalence of Nicotine Stomatitis among patients visiting a private dental hospital is predominantly seen in patients above 50 years old. Elderly individuals are vulnerable to oral mucosal lesions when compared to younger individuals. White patch is predominantly seen in smokers' palates and is painful due to chronic heat.

Keywords: nicotinic stomatitis, Stomatitis Nicotina, Smoker's keratosis, Pathology, Smoking, Palate, innovative technology, novel method.

1. Introduction

Smoking or chewing tobacco are deleterious to health that leads to development of oral cancer, premalignant lesions and other mucosal lesions such as Nicotine Stomatitis (1). The objective of this article is to study the prevalence of Nicotine Stomatitis among patients visiting a private dental hospital. Consumption of tobacco is not only harmful but can also affect the infants or adults who inhale the smoke. It can lead to development of other chronic diseases such as pulmonary disorders, cardiovascular disorders, malignancies (2). Nicotine Stomatitis is an asymptomatic lesion

associated with cigarette smoking usually appearing as white changes in the hard palate, often combined with multiple red dots located centrally in a small, elevated nodule. The red dots represent the ducts of minor salivary glands that have become inflamed, and which are painless. This phenomenon is caused by a response of the palatal mucosa to chronic heat. In severe cases, the mucosa may show fissures and develop a dried lake appearance. Oral mucosal lesions are frequently seen in elderly and male (3). The elderly population has high risk in developing pathologies, age-related metabolic changes, nutritional deficiencies, medication-related and deleterious habits such as tobacco and alcohol

consumption (4).

Patients identified with the nicotine stomatitis were classified by Greenburg et al. into three grades.

1. Grade I: Mild- Consisting of red, dot-like opening on a blanched area.
2. Grade II: Moderate- Characterized by well-defined elevation with central umbilication
3. Grade III: Severe Marked by papules of 5 mm or more with umbilication of 2-3 mm.(5).

2. Materials and Methods

This is a single centered retrospective study that was conducted in Private Dental College, Chennai, India. Ethical approval was obtained from the Institutional review board prior to the start of the study.

The data was collected by reviewing the patients records from Dental Information Archiving Software (DIAS). A total of 40 patients were reported with Nicotinic Stomatitis from July 2020 to March 2021. Inclusion criteria were selected based on patients diagnosed with nicotinic stomatitis and exclusion criteria were patients reported with lesions other than Nicotine stomatitis such as oral submucous fibrosis, leukoplakia, all available case sheets were reviewed and analyzed in SPSS version 23. Data analysis was done using chi-square test.p value was set as 0.05 as level of significance.

3. Results

In this study forty patients were reported with smokers' palate. Data from the current study revealed that 37% of patients that are above 50 years old are more prevalent to smokers' palates (Figure 1). Among them all of them were males. Among the reported cases 37 % of patients gave a history of white patch followed by Hyperkeratinization (Figure 2). Pearson chi square test shows 0.00, (p value < 0.05). Hence, it is statistically significant. When association was done between the age group and clinical features of the respondents. 40- 50 years of patients with a nicotine stomatitis presented with white patch and hyperkeratinization. Pearson chi square test shows p value 0.470, (p value > 0.05). Hence, it is statistically not significant (Figure 3).

AGE GROUP

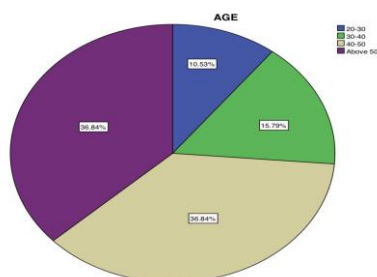


Figure 1. The above pie chart represents the age groups of the patients reported with nicotinic stomatitis. Blue denotes 20-30 years old, green denotes 30-40 years old, Binge colour denotes 40-50 years old and purple denotes above 50 years old. Patients above 50 years of age and 40-50 years of age (36.84%) are more prevalent to smokers' palates.

Clinical Features

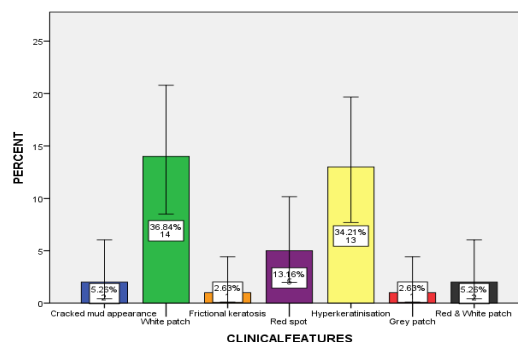


Figure 2. The above graph represents the clinical features of smokers' palates reported to our college. The X-axis represents the clinical features of the nicotine stomatitis and Y axis represents the percentage of cases. Green colour depicts white patch (36.84%). Blue colour depicts Cracked mud appearance (5.25%), red colour depicts grey patch (2.63%), orange colour depicts Frictional keratosis (2.63%), yellow colour depicts Hyperkeratinisation (34.21%), purple colour depicts red spot (13.16%) and black colour depicts Red & white patch (5.26%). nicotine stomatitis is usually presented as white patch with hyperkeratinization.

Age Group and Clinical Features

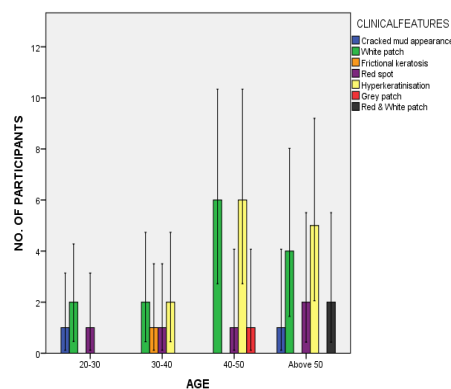


Figure 3. The bar graph represents the association between the age group and clinical features of the respondents. X axis represents the age of the patients and Y axis represents the number of participants. Green colour depicts white patch. Blue colour depicts Cracked mud appearance, red colour depicts grey patch, orange colour depicts Frictional keratosis, yellow colour depicts Hyperkeratinisation, purple colour depicts red spot and black colour depicts Red & white patch. 40- 50 years of patients with a nicotine stomatitis presented with white patch and hyperkeratinization. Pearson chi square test shows p value 0.470, (p value > 0.05). Hence, it is statistically not significant.

4. Discussion

Tobacco dependence is a serious public health problem. Smoking or Chewing Tobacco are deleterious to Oral health, and it promotes the development of oral cancer, premalignant lesions and other oral mucosal lesions such as leukoplakia, nicotine stomatitis (nicotine stomatitis) and smoker's melanosis. Smokers' palate shows inflammation of the opening of minor salivary glands due to chronic heat during

smoking. Our study showed that patients above 50 years of age and 40-50 years of age (36.84%) are more prevalent to smokers' palates. Above 50 years is more prevalent to smokers' palates as previous study shows that elderly individuals are more vulnerable to oral mucosal lesions as compared to younger individuals (26). Oral mucosal lesions are more common in elderly population. They are at high risk of developing many pathologies and increased occurrence of systemic diseases. They are also usually under long term medications for systemic diseases. They also wear prostheses and might have deleterious habits like tobacco or alcohol as shown in one study (27). Previous study shows that Oral submucous fibrosis (11), nicotine stomatitis and leukoplakia showed more prevalence in the age group of 55–70 years when compared to 70–90 years. These lesions also fall under the category of chronic oral mucosal diseases (28). White patch and Hyperkeratinization are prevalent clinical features of smokers' palates and are painful due to chronic heat. Greyish white appearance due to periductal keratinization of the minor salivary glands as shown in one study (29). Hyperpigmentation refers to well-defined diffuse or focal greyish black pigmentation of the palatal mucosa due to increased melanin production by melanocytes. This pigmentation was limited to the hard palate and had regular margins and was produced due to increased melanin deposition as a protective reaction to heat and its antioxidant properties against toxic products produced during combustion of tobacco within the oral cavity (30). Nicotinic stomatitis primarily presents as an erythematous area on the posterior rugae after that the lesion converts to diffuse leathery grayish-white palatal plaque. Red points can also be seen on the white mucosa that are actually widened and swollen orifices of accessory salivary glands with periductal nodular keratinization (31). In addition, thickened palatal mucosa intermingled with fissures produce a "dried mud" appearance. White plaques may affect marginal gingiva and interdental papillae as well as shown in one study (32). The prevalence of Nicotine Stomatitis is predominant among males, Similarly studies reported that the prevalence was higher in males with no women present (29) (33,34)(35). Frictional (traumatic) keratosis is defined as white plaques with a rough and frayed surface clearly related to an identifiable source of mechanical irritation. These lesions can occasionally mimic dysplastic leukoplakia. The prevalence has been reported as high as 3 %. This category includes linea alba, and cheek, lip, and tongue chewing. Traumatic keratosis has never been shown to undergo malignant changes. Once the irritant is removed the lesion must resolve within two weeks; otherwise, biopsy is mandatory to rule out a dysplastic lesion as shown in one study (5).

Limitation of the study is less sample size and homogenous population. Further research should be done in a larger group to generalize the results.

5. Conclusion

It can be concluded that a nicotine stomatitis is predominantly seen in patients above 50 years old. Elderly individuals are vulnerable to oral mucosal lesions when compared to younger individuals. White patch is predominantly seen in smokers' palates and is painful due to chronic heat.

Acknowledgment: The authors would like to thank Saveetha Dental College for their support in conducting the study.

Conflict Of Interest: All the authors declare that there was no conflict of interest in the present study.

Source Of Funding

The present study was supported by the following agencies.

- Saveetha Dental College
- Saveetha Institute of Medical and Technical Sciences (SIMATS)
- Saveetha University
- Eminence Public Relations

References

- Steele JC, Clark HJ, Hong CHL, Jurge S, Muthukrishnan A, Kerr AR, et al. World Workshop on Oral Medicine VI: an international validation study of clinical competencies for advanced training in oral medicine. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2015 Aug;120(2):143–51. e7.
- Lancet T, The Lancet. DFID's health strategy [Internet]. Vol. 369, *The Lancet*. 2007. p. 1973. Available from: [http://dx.doi.org/10.1016/s0140-6736\(07\)60919-2](http://dx.doi.org/10.1016/s0140-6736(07)60919-2)
- Ali M, Joseph B, Sundaram D. Prevalence of oral mucosal lesions in patients of the Kuwait University Dental Center [Internet]. Vol. 25, *The Saudi Dental Journal*. 2013. p. 111–8. Available from: <http://dx.doi.org/10.1016/j.sdentj.2013.05.003>
- Rohini S, Herald J, Sherlin, Jayaraj G. Prevalence of oral mucosal lesions among elderly population in Chennai: a survey [Internet]. Vol. 26, *Journal of Oral Medicine and Oral Surgery*. 2020. p. 10. Available from: <http://dx.doi.org/10.1051/mbcb/2020003>
- Glick M. *Burket's Oral Medicine*, 12th Edition. PMPH USA; 2015. 732 p.
- Princeton B, Santhakumar P, Prathap L. Awareness on Preventive Measures taken by Health Care Professionals Attending COVID-19 Patients among Dental Students [Internet]. Vol. 14, *European Journal of Dentistry*. 2020. p. S105–9. Available from: <http://dx.doi.org/10.1055/s-0040-1721296>
- Mathew MG, Samuel SR, Soni AJ, Roopa KB. Evaluation of adhesion of *Streptococcus mutans*, plaque accumulation on zirconia and stainless-steel

- crowns, and surrounding gingival inflammation in primary molars: randomized controlled trial. *Clin Oral Investig*. 2020 Sep;24(9):3275–80.
- Sridharan G, Ramani P, Patankar S, Vijayaraghavan R. Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma. *J Oral Pathol Med*. 2019 Apr;48(4):299–306.
- R H, Ramani P, Ramanathan A, R JM, S G, Ramasubramanian A, et al. CYP2 C9 polymorphism among patients with oral squamous cell carcinoma and its role in altering the metabolism of benzo[a]pyrene. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2020 Sep;130(3):306–12.
- Antony JVM, Vini Mary Antony J, Ramani P, Ramasubramanian A, Sukumaran G. Particle size, penetration rate and effects of smoke and smokeless tobacco products – an invitro analysis [Internet]. Vol. 7, *Heliyon*. 2021. p. e06455. Available from: <http://dx.doi.org/10.1016/j.heliyon.2021.e06455>
- Sarode SC, Gondivkar S, Sarode GS, Gadbaile A, Yuwanati M. Hybrid oral potentially malignant disorder: A neglected fact in oral submucous fibrosis. *Oral Oncol*. 2021 Jun 16;105390.
- R H, Hannah R, Ramani P, Tilakaratne WM, Sukumaran G, Ramasubramanian A, et al. Author response for “Critical appraisal of different triggering pathways for the pathobiology of pemphigus vulgaris—A review” [Internet]. 2021. Available from: <http://dx.doi.org/10.1111/odi.13937/v2/response1>
- Chandrasekar R, Chandrasekhar S, Sundari KKS, Ravi P. Development and validation of a formula for objective assessment of cervical vertebral bone age. *Prog Orthod*. 2020 Oct 12;21(1):38.
- Subramanyam D, Gurunathan D, Gaayathri R, Vishnu Priya V. Comparative evaluation of salivary malondialdehyde levels as a marker of lipid peroxidation in early childhood caries. *Eur J Dent*. 2018 Jan;12(1):67–70.
- Jeevanandan G, Thomas E. Volumetric analysis of hand, reciprocating and rotary instrumentation techniques in primary molars using spiral computed tomography: An in vitro comparative study [Internet]. Vol. 12, *European Journal of Dentistry*. 2018. p. 021–6. Available from: http://dx.doi.org/10.4103/ejd.ejd_247_17
- Ponnulakshmi R, Shyamaladevi B, Vijayalakshmi P, Selvaraj J. In silico and in vivo analysis to identify the antidiabetic activity of beta sitosterol in adipose tissue of high fat diet and sucrose induced type-2 diabetic experimental rats. *Toxicol Mech Methods*. 2019 May;29(4):276–90.
- Sundaram R, Nandhakumar E, Haseena Banu H. Hesperidin, a citrus flavonoid ameliorates hyperglycemia by regulating key enzymes of carbohydrate metabolism in streptozotocin-induced diabetic rats. *Toxicol Mech Methods*. 2019 Nov;29(9):644–53.
- Alsawalha M, Rao CV, Al-Subaie AM, Haque SKM, Veeraraghavan VP, Surapaneni KM. Novel mathematical modelling of Saudi Arabian natural diatomite clay [Internet]. Vol. 6, *Materials Research Express*. 2019. p. 105531. Available from: <http://dx.doi.org/10.1088/2053-1591/ab2f9b>
- Tang X, Yu J, Li M, Zhan D, Shi C, Fang L, et al. Inhibitory effects of triterpenoid betulin on inflammatory mediators inducible nitric oxide synthase, cyclooxygenase-2, tumor necrosis factor-alpha, interleukin-6, and proliferating cell nuclear antigen in 1,2-dimethylhydrazine-induced rat colon carcinogenesis [Internet]. Vol. 16, *Pharmacognosy Magazine*. 2020. p. 841. Available from: http://dx.doi.org/10.4103/pm.pm_516_19
- Shree KH, Hema Shree K, Ramani P, Herald Sherlin, Sukumaran G, Jeyaraj G, et al. Saliva as a Diagnostic Tool in Oral Squamous Cell Carcinoma – a Systematic Review with Meta Analysis [Internet]. Vol. 25, *Pathology & Oncology Research*. 2019. p. 447–53. Available from: <http://dx.doi.org/10.1007/s12253-019-00588-2>
- Zafar A, Sherlin HJ, Jayaraj G, Ramani P, Don KR, Santhanam A. Diagnostic utility of touch imprint cytology for intraoperative assessment of surgical margins and sentinel lymph nodes in oral squamous cell carcinoma patients using four different cytological stains. *Diagn Cytopathol*. 2020 Feb;48(2):101–10.
- Karunagar M, Murali P, Palaniappan V, Sivapathasundharam B. Expression and distribution pattern of podoplanin in oral submucous fibrosis with varying degrees of dysplasia – an immunohistochemical study [Internet]. Vol. 42, *Journal of Histotechnology*. 2019. p. 80–6. Available from: <http://dx.doi.org/10.1080/01478885.2019.1594543>
- Sarode SC, Gondivkar S, Gadbaile A, Sarode GS, Yuwanati M. Oral submucous fibrosis and heterogeneity in outcome measures: a critical viewpoint. *Future Oncol*. 2021 Jun;17(17):2123–6.
- Raj Preeth D, Saravanan S, Shairam M, Selvakumar N, Selestin Raja I, Dhanasekaran A, et al. Bioactive Zinc (II) complex incorporated PCL/gelatin electrospun nanofiber enhanced bone tissue regeneration. *Eur J Pharm Sci*. 2021 May 1; 160: 105768.
- Myers J. *Oral Cancer Metastasis*. Springer Science & Business Media; 2009. 346 p.
- Rohini S, Jayanth Kumar V. Incidence of dental caries and pericoronitis associated with impacted mandibular third molar-A radiographic study [Internet]. Vol. 10, *Research Journal of Pharmacy and Technology*. 2017. p. 1081. Available from: <http://dx.doi.org/10.5958/0974-360x.2017.00196.2>
- Berry AJ. Tratamiento de las punciones accidentales [Internet]. *Toma de Decisiones en Anestesiología*. 2008. p. 616–20. Available from: <http://dx.doi.org/10.1016/b978-84-8086-334-6.50214-5>
- Saraswathi TR, Ranganathan K, Shanmugam S, Sowmya R, Narasimhan PD, Gunaseelan R. Prevalence of oral lesions in relation to habits: Cross-sectional study in South India. *Indian J Dent Res*. 2006 Jul;17(3):121–5.
- Sholapurkar A, Vengal M, Mathew A, Pai K. The prevalence of oral mucosal lesions in patients visiting

a dental school in Southern India [Internet]. Vol. 19, Indian Journal of Dental Research. 2008. p. 99. Available from: <http://dx.doi.org/10.4103/0970-9290.40461>

Kim D-S, Park S-H, Kwon S-B, Joo Y-H, Youn S-W, Sohn U-D, et al. Temperature regulates melanin synthesis in melanocytes. Arch Pharm Res. 2003 Oct;26(10):840–5.

R P, Pramod R. Red and White Lesions of the Oral Mucosa [Internet]. Textbook of Oral Medicine. 2014. p. 231–231. Available from: http://dx.doi.org/10.5005/jp/books/12196_18

Jessri M, Mawardi H, Farah CS, Woo S-B. White and Red Lesions of the Oral Mucosa [Internet]. Contemporary Oral Medicine. 2017. p. 1–42. Available from: http://dx.doi.org/10.1007/978-3-319-28100-1_16-1

Patil P, Bathi R, Chaudhari S. Prevalence of oral mucosal lesions in dental patients with tobacco smoking, chewing, and mixed habits: A cross-sectional study in South India [Internet]. Vol. 20, Journal of Family and Community Medicine. 2013. p. 130. Available from: <http://dx.doi.org/10.4103/2230-8229.114777>

Behura SS, Masthan MK, Narayanasamy AB. Oral Mucosal Lesions Associated with Smokers and Chewers - A Case-Control Study in Chennai Population. J Clin Diagn Res. 2015 Jul;9(7): ZC17–22.

Kamala KA, Sankethguddad S, Nayak AG, Sanade AR, Ashwini Rani SR. Prevalence of oromucosal lesions in relation to tobacco habit among a Western Maharashtra population. Indian J Cancer. 2019 Jan;56(1):15–8.