



## Association of tobacco dependence and oral hygiene status

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### ABSTRACT



Tobacco use has a major public health concern that results in significant morbidity and mortality. Tobacco use has an injurious effect on oral health such as oral cancer and potentially malignant disorders like leukoplakia, oral submucous fibrosis. Tobacco use has been found to have a strong, chronic and dose dependent effect on periodontal tissues due to poor oral hygiene caused by increased deposit of debris and calculus among tobacco users. This study aimed to find the association between oral hygiene status and tobacco dependence. A retrospective study was conducted using the case records of patients in University hospital. Data on tobacco dependence and oral hygiene status from 150 patient records were collected and analysed for association. Descriptive statistics and chi-square association was done. The mean age of patients in the records was  $35 \pm 12.44$  years and males (14%) had severe tobacco dependence. The mean Oral Hygiene Index Simplified (OHIS) score was found to be  $2.03 \pm 1.009$  which is interpreted as fair. There was no statistically significant association between oral hygiene status and tobacco dependence ( $p= 0.157$ ). Tobacco dependence has no role in the oral hygiene status of an individual.

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### INTRODUCTION

Tobacco belongs to the family Solanaceae of genus *Nicotiana*, which is a powerful addictive substance which is harmful to health (Tushingham *et al.*, 2018).

The two common forms consumed in India, smoking (cigarettes, Bidis) and smokeless forms (gutka, pan masala, areca nuts). Tobacco has been estimated to cause premature death worldwide (Ministry of Health and Family Welfare, 2007). According to WHO, in India 94 million men and 45 million women used tobacco in smoke or smokeless form (WHO, 2020). Tobacco smoking is linked to many serious illnesses such as cancer, cardio pulmonary disease and many adverse health problems (Wald and Hackshaw, 1996).

One of the important components of tobacco is nicotine. Nicotine has been associated with neurotransmitters release, which leads to arousal, mood modulation, performance enhancement, analgesic, weight loss in tobacco users. Over the time of tobacco usage triggers the neural adaptation to homeostasis and leads to craving for the drug or drug seek-

ing behaviour in the form of smoking, alcohol (Brandon *et al.*, 1990; Harini and Leelavathi, 2019). Studies have reported higher likelihood of psychiatric disorder in individuals with high dependence on tobacco (Glassman, 1990).

Tobacco consumption causes a variety of oral manifestations due to presence of toxins and carcinogens present in smoke emitted from tobacco such as pH change (Pratha and Prabakar, 2019), alteration in immune response, halitosis, plaque accumulation (Mathew *et al.*, 2020) and staining of teeth (Asmussen and Hansen, 1986; Kumar and Vijayalakshmi, 2017). Tobacco has an increased risk for development of potentially malignant disorders such as oral submucous fibrosis, leukoplakia and palatal keratosis which has a higher chance of developing into malignant condition (Amagasa *et al.*, 2011). Tobacco has been found to have positive correlation with many oral diseases such as dental caries (Prabakar *et al.*, 2016; Samuel *et al.*, 2020) and periodontal disease (Nivedita *et al.*, 2018). Oral health is an important aspect in terms of the magnitude of dental problems and morbidity associated with it, the people in most parts of the world are not aware of the impact of tobacco on oral health (Fakhfakh *et al.*, 2002; Pavithra and Jayashri, 2019). Smokeless tobacco usage has been associated with increased caries prevalence due to presence of sweeteners present in chewing tobacco. Thus caries prevention in tobacco users can be prevented by use of sealants in the younger age group (Khatri *et al.*, 2019; Prabakar *et al.*, 2018a,c,b), fluoride application (Kumar and Preethi, 2017) nutritional counselling (Neralla *et al.*, 2019), remineralising dentifrice (Mohapatra *et al.*, 2019; Prabakar *et al.*, 2018a) and regular dental visits (Kumar and Preethi, 2017; Kannan *et al.*, 2017). With this background the present study intended to find the association of tobacco dependence and oral hygiene status.

## MATERIALS AND METHODS

### Study setting and design

A retrospective study was conducted to find out the association between tobacco dependence (smoking and smokeless) and oral hygiene status. The study was conducted using case reports of patients visiting the author's University hospital.

### Sample selection and criteria

This retrospective study was employed by reviewing 86,000 records of patients visiting the University hospital from June 2019 to March 2020. A total of 1283 records with signed informed consent were

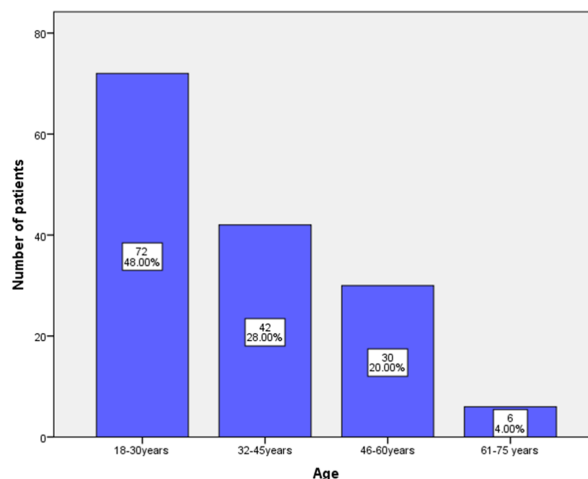


Figure 1: Bar graph showing age distribution based on gender

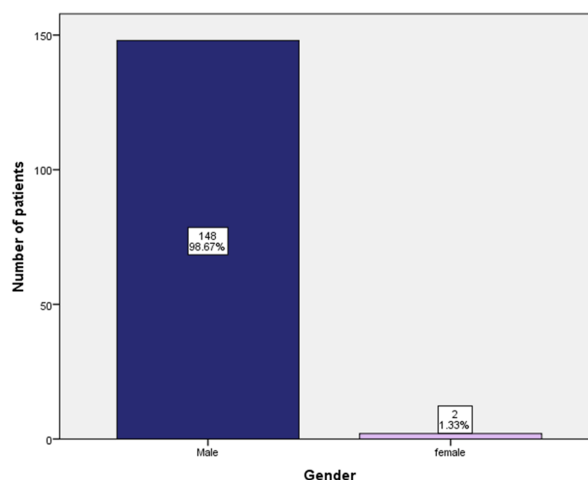


Figure 2: Bar graph showing gender distribution

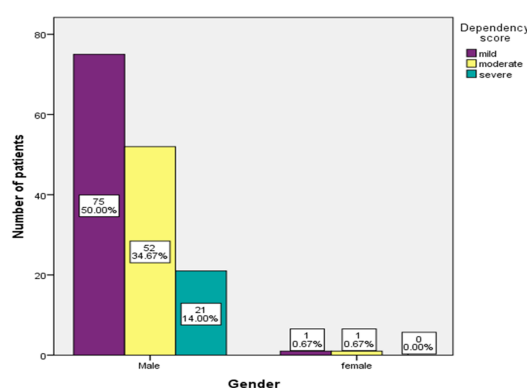
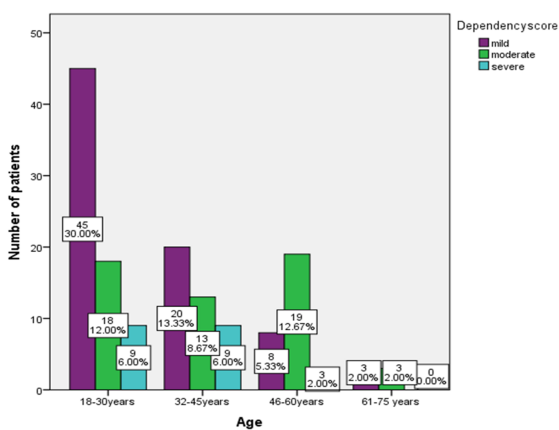
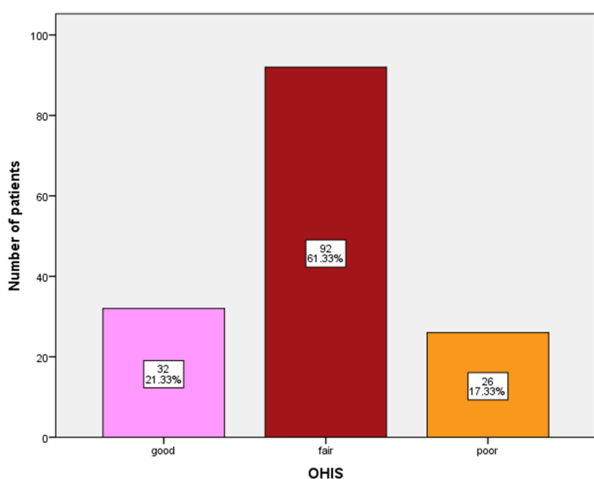


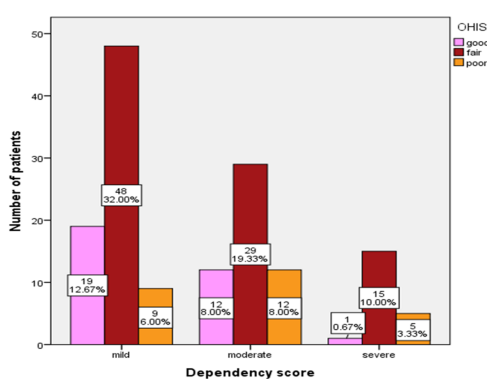
Figure 3: Bar graph showing tobacco dependency based on gender



**Figure 4: Cluster bar graph showing tobacco dependence based on age groups**



**Figure 5: Simple bar graph showing the distribution of OHIS score among the patients**



**Figure 6: Cluster bar graph showing tobacco dependency based on oral hygiene status**

sorted. Of which 150 case records containing information on tobacco dependence and oral hygiene status of current smokers aged above 18 years were retrieved. We made an effort that all the 150 (148 males and 2 females) retrieved case records had all the information needed for the study with no duplicates. No gender restriction placed. We made an effort to remove all duplicates and incomplete case records with the help of an external reviewer.

**Ethical approval**

Prior permission to utilize the data was obtained from the University and was approved under ethical approval number SDC/SIHEC/2020/DIASDATA/0619-0320.

**Instruments**

Tobacco dependence recorded in the case sheets were done using Fagerstrom nicotine dependence scale. The instrument includes a separate set of questions for smoking and smokeless A score of 0-2 represents mild dependence, 3-6 represents moderate dependence, score >6 represents severe dependence (Parmar et al., 2008). The oral hygiene status of patients in the case records was measured using Green and Vermillion Oral Hygiene Index -Simplified (OHIS) which determines debris and calculus grades on six indexed teeth (16/17, 11/21, 26/27, 36/37, 31/41, 46/47) separately. A total oral hygiene score is the sum of debris and calculus score. A total score of 0-1.2 represents good oral hygiene, 1.3-3 represents fair oral hygiene and score 3-6 represents poor oral hygiene.

**Data collection**

Data on patients' age, gender, tobacco dependence and oral hygiene status was collected and tabulated in Microsoft Excel and imported to SPSS statistical analysis of version 23.0. The age of the patients in the case records was categorized for the convenience of statistical analysis such as 15-30 years, 31-45 years, 46-60 years, 61-75 years.

**Statistical analysis**

The collected data was analysed using Statistical Package for Social Sciences (SPSS) version 23.0. Descriptive statistics were used to present the prevalence of tobacco dependence and oral hygiene status and a chi-square association test was done to find the association between tobacco dependence and oral hygiene status. A statistical significance p value <0.05 was considered.

**RESULTS AND DISCUSSION**

From the total of 150 subjects the following results were observed. The mean age of tobacco users was

found to be  $35 \pm 12.4$  years.

Figure 1 shows the frequency distribution of age. About 48% were in the age group of 18 - 30 years. The X-axis shows age groups. Y-axis shows the number of patients. Most of the tobacco users were in the age group 18-30 years.

Figure 2 shows the frequency distribution of gender. There were about 98.97% of males and 1.3% of females. The X-axis represents gender distribution. Y-axis represents the number of patients. Males dominate the study population.

Figure 3 shows the association of tobacco dependency based on gender, 14% males had severe dependency, 34.67% had moderate dependency and 50% had low dependency, females had moderate and low tobacco dependency. There was no statistically significant association between gender and tobacco dependency ( $p=0.816$ ). The X-axis shows the dichotomized variables of gender. Y-axis shows the number of patients with tobacco dependence, where violet represents mild tobacco dependence, yellow represents moderate tobacco dependence and blue colour represents severe tobacco dependence. Association between gender and tobacco dependency (Pearson Chi-square value -0.407,  $p=0.816$ ) ( $p>0.05$ , not significant). Tobacco dependency is high among males.

Figure 4 shows high tobacco dependency was more (6%) in the age group of 31-45 years & 18-30 years and 46-60 years (2%). On total 79.01% of patients had mild dependency, 11.3% had high dependency and 9.69% had moderate dependency. The X-axis shows age groups in years, Y-axis shows a number of patients with tobacco dependence where violet colour represents mild tobacco dependency, green colour represents moderate tobacco dependency and blue colour represents severe tobacco dependency. No significant association between age and nicotine dependence (Pearson's chi-square value: 0.789;  $p$ -value =0.267). Severe tobacco dependence was seen in the age group of 18-45 years.

Figure 5 shows oral hygiene status of the patients which was fair in about 61.3% patients, poor in 17.3% patients and good in 21.3% patients. The X-axis shows ordinal variables of oral hygiene status. Y-axis shows the number of patients. Most of the patients had a fair score for oral hygiene.

Figure 6 shows distribution of tobacco dependence and oral hygiene status. About 32% of patients with mild tobacco dependency had fair oral hygiene and 6% had poor oral hygiene. Among moderate tobacco dependency 19.33% of patients had fair oral hygiene, 8% had poor oral hygiene. In high

tobacco dependency, 10% had fair oral hygiene and 3.33% had poor oral hygiene. There was no statistically significant association between tobacco dependence and oral hygiene status ( $p=0.157$ ). The X-axis shows tobacco dependency. Y-axis shows the number of patients with oral hygiene status within each nicotine dependence. where pink colour represents good oral hygiene, red colour represents fair oral and orange colour represents poor oral hygiene. No significant association between tobacco dependence and OHIs (Fisher's exact test value =6.525;  $p=0.157$ ). Most of the patients with nicotine dependence have fair oral hygiene status.

Tobacco use has been reported to cause various health manifestations and higher morbidity and mortality rate (Ministry of Health and Family Welfare, 2007). The present study findings showed that tobacco use has been significantly higher in males 98.7% as compared to females 1.3%. Similar findings have been reported by (Ahsan et al., 2020), where the prevalence rate of tobacco usage among males was 89.8% (Ahsan et al., 2020). (Dsouza, 2005), in his study reported 75% prevalence rate of smoking among males (Dsouza, 2005). There were no contradictory findings to the present results, this could be due to smoking prevalence being higher among males due to autonomous lifestyle, while females do not accept the fact of tobacco consumption socially (Pampel, 2006).

In the present study, the majority of tobacco use is in adults between 18 to 30 years of age. Similarly Biener et al, reported young adults as vulnerable targets of tobacco, as they are exposed and initiated to tobacco at this age (Biener and Albers, 2004). In contrast, Souza et al found higher tobacco usage and poor hygiene among the older age group above 50 years, suggestive of many years of tobacco usage which gradually leads to poor oral hygiene (Dsouza, 2005).

The present study findings show patients with high and moderate tobacco dependency had higher fair oral hygiene status compared to mild dependency. Similar findings (Nwhator et al., 2010), found higher mean oral hygiene index score with poor oral hygiene in smokers than non-smokers (Nwhator et al., 2010). (Dsouza, 2005), reported 13.43% of smokers had poor oral hygiene status (Dsouza, 2005) which is in consistency with the present study.

However potential limitations may interrupt our results, the study lacked in assessing the other factors such as socio-economic, literacy rates, oral hygiene practices which contribute to oral hygiene status of an individual. Also, due to cultural and ethi-

cal variation in knowledge and attitude towards oral health the study results cannot be extrapolated to other populations. Further prospective cohort studies with snowball sampling will be needed to find the strength and magnitude of association.

## CONCLUSION

Within the limitations of the study, there is significant association between tobacco dependence and oral hygiene status. Individuals with moderate and high tobacco dependence have fair to poor oral hygiene status. Innovations on tobacco cessation should be promoted to create awareness among the general population to curb oral diseases.

## Authors contribution

First author (Kiruthika Patturaja) performed the analysis, interpretation and wrote the manuscript.

Second author (Arthi Balsubramaniam) contributed to conception, data design, analysis, interpretation and critically revised the manuscript.

Third author (Iffat Nasim) participated in the study and revised the manuscript. All the three authors have discussed the results and contributed to the final manuscript.

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## Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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## REFERENCES

- Ahsan, I., Menon, I., Gupta, R., Sharma, A., Das, D., Ashraf, A. 2020. Comparison of oral health status among adult tobacco users and non-tobacco users of Ghaziabad District, Uttar Pradesh: A cross sectional study. *Journal of Family Medicine and Primary Care*, 9(2):1143–1143.
- Amagasa, T., Yamashiro, M., Uzawa, N. 2011. Oral premalignant lesions: from a clinical perspective. *International Journal of Clinical Oncology*, 16(1):5–14.
- Asmussen, E., Hansen, E. K. 1986. Surface discoloration of restorative resins in relation to surface softening and oral hygiene. *European Journal of Oral Sciences*, 94(2):174–177.
- Biener, L., Albers, A. B. 2004. Young Adults: Vulnerable New Targets of Tobacco Marketing. *American Journal of Public Health*, 94(2):326–330.
- Brandon, T. H., Tiffany, S. T., Obremski, K. M., Baker, T. B. 1990. Postcessation cigarette use: The process of relapse. *Addictive Behaviors*, 15(2):105–114.
- Dsouza, V. M. 2005. A correlative study on oral health status and knowledge on oral health hazards among adults consuming tobacco of selected communities of Managlore. RGUHS.
- Fakhfakh, R., Hsairi, M., Maalej, M. 2002. Tobacco use in Tunisia: behaviour and awareness. *Bulletin of the World Health Organization*, 80(5):350–356.
- Glassman, A. H. 1990. Smoking, smoking cessation, and major depression. *JAMA: The Journal of the American Medical Association*, 264(12):1546–1549.
- Harini, G., Leelavathi, L. 2019. Nicotine Replacement Therapy for Smoking Cessation-An Overview. *Indian Journal of Public Health Research & Development*, 10(11):3588–3588.
- Kannan, S. S. D., Kumar, V. S., Rathinavelu, P. K., Disaster Management and Human Health Risk 2017. Awareness and attitude towards mass disaster and its management among house surgeons in a dental college and hospital in Chennai, India . 173:121–129.
- Khatri, S., Madan, K., Srinivasan, S., Acharya, S. 2019. Retention of moisture-tolerant fluoride-releasing sealant and amorphous calcium phosphate-containing sealant in 6–9-year-old children: A randomized controlled trial. *Journal of Indian Society of Pedodontics and Preventive Dentistry*, 37(1):92–92.
- Kumar, R. P., Preethi, R. 2017. Assessment of Water Quality and Pollution of Porur, Chembarambakkam and Puzhal Lake. *Research Journal of Pharmacy and Technology*, 10(7):2157–2157.
- Kumar, R. P., Vijayalakshmi, B. 2017. Assessment of Fluoride Concentration in Ground Water in Madurai District, Tamil Nadu, India. *Research Journal of Pharmacy and Technology*, 10(1):309–309.
- Mathew, M. G., Samuel, S. R., Soni, A. J., Roopa, K. B. 2020. Evaluation of adhesion of Streptococcus mutans, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars: randomized controlled trial. *Clinical Oral Investigations*, 24(9):3275–3280.

- Ministry of Health and Family Welfare 2007. Government of India, Ministry of Health and Family Welfare. *Annual Report*.
- Mohapatra, S., Kumar, R. P., Arumugham, I. M., Sakthi, D. S., Jayashri, P. 2019. Assessment of Microhardness of Enamel Carious Like Lesions After Treatment with Nova Min, Bio Min and Remin Pro Containing Toothpastes: An in Vitro Study. *Indian Journal of Public Health Research & Development*, 10(10):375-375.
- Neralla, M., Jayabalan, J., George, R., Rajan, J., M.P, S. K., Haque, A. E., Balasubramaniam, A., Christopher, P. J. 2019. Role of nutrition in rehabilitation of patients following surgery for oral squamous cell carcinoma. *International Journal of Research in Pharmaceutical Sciences*, 10(4):3197-3203.
- Nivedita, C. B., Srivastava, B. K., Eshwar, S. 2018. Comparison of quality of life among dental caries and periodontal patients using EuroQoL-5D in KLE society's institute of dental sciences, Bangalore: A cross-sectional study. *International Journal of Applied Dental Sciences*, 4(2):04-08.
- Nwhator, S., AyanbadeJO, Akhiobare, Oginni, Lung, Arowojolu, D. 2010. Awareness of link between smoking and periodontal disease in Nigeria: a comparative study. *Research and Reports in Tropical Medicine*, 1:45-45.
- Pampel, F. C. 2006. Global Patterns and Determinants of Sex Differences in Smoking. *International Journal of Comparative Sociology*, 47(6):466-487.
- Parmar, G., Sangwan, P., Vashi, P., Kulkarni, P., Kumar, S. 2008. Effect of chewing a mixture of areca nut and tobacco on periodontal tissues and oral hygiene status. *Journal of Oral Science*, 50(1):57-62.
- Pavithra, R. P., Jayashri, P. 2019. Influence of Naturally Occurring Phytochemicals on Oral Health. *Research Journal of Pharmacy and Technology*, 12(8):3979-3979.
- Prabakar, J., John, J., Arumugham, I., Kumar, R., Srisakthi, D. 2018a. Comparative evaluation of retention, cariostatic effect and discoloration of conventional and hydrophilic sealants - A single blinded randomized split mouth clinical trial. *Contemporary Clinical Dentistry*, 9(6):233-233.
- Prabakar, J., John, J., Arumugham, I. M. 2018b. Comparative Evaluation of the Viscosity and Length of Resin Tags of Conventional and Hydrophilic Pit and Fissure Sealants on Permanent Molars: An In vitro Study. *Contemporary clinical dentistry*, 9(3):388-394.
- Prabakar, J., John, J., Arumugham, I. M., Kumar, R. P., Sakthi, D. S. 2018c. Comparing the effectiveness of probiotic, green tea, and chlorhexidine- and fluoride-containing dentifrices on oral microbial flora: A double-blind, randomized clinical trial. *Contemporary Clinical Dentistry*, 9(4):560-560.
- Prabakar, J., John, J., Srisakthi, D. 2016. Prevalence of dental caries and treatment needs among school going children of Chandigarh. *Indian Journal of Dental Research*, 27(5):547-547.
- Pratha, A. A., Prabakar, J. 2019. Comparing the effect of Carbonated and energy drinks on salivary pH- In Vivo Randomized Controlled Trial. *Research Journal of Pharmacy and Technology*, 12(10):4699-4699.
- Samuel, S. R., Acharya, S., Rao, J. C. 2020. School Interventions-based Prevention of Early-Childhood Caries among 3-5-year-old children from very low socioeconomic status: Two-year randomized trial. *Journal of Public Health Dentistry*, 80(1):51-60.
- Tushingham, S., Snyder, C. M., Brownstein, K. J., Damitio, W. J., Gang, D. R. 2018. Biomolecular archaeology reveals ancient origins of indigenous tobacco smoking in North American Plateau. *Proceedings of the National Academy of Sciences*, 115(46):11742-11747.
- Wald, N. J., Hackshaw, A. K. 1996. Cigarette smoking: an epidemiological overview. *British Medical Bulletin*, 52(1):3-11.
- WHO 2020. Bulletin of the World Health Organization (n.d.). *World Health Organization*, 84(1).