Association Between Tobacco Dependence and Quit Rate

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ABSTRACT
Tobacco usage is a major cause of death from cancer, cardiovascular disease, pulmonary diseases. Nicotine addiction which causes physical and psychological dependency, might function as a barrier to smoking cessation. This study aimed to find the association between tobacco dependence and quit rate. A retrospective study was conducted using case records of patients visiting University hospital. About 100 case reports containing information on tobacco dependence and quit rate (in terms of a number of relapses) were retrieved and analysed. Descriptive statistics was done to present the sociodemographic details. Chi-square association to find the association tobacco dependence and relapse rate. Tobacco dependence was higher in males compared to females among all the age groups. It was seen that high nicotine dependence was noted among the subjects of the age group 51 - 60 years (3%). Quit rate with less number of relapses was noted among individuals with low tobacco dependence. There was a statistically significant association between tobacco dependence and quit status (p=0.000). Males (36.5%) had more relapse rate compared to females. About 44.4% of patients with medium dependence had a high number of relapses followed by patients with very low dependence (30.56%). Among 18% of patients with high nicotine dependence, 10% of patients had more number of relapses. Very low and low dependence have more number of relapses with no association between nicotine dependence and quit status.

INTRODUCTION
Tobacco is nothing but a preparation of the nicotine rich leaves of an American plant, which are cured by process of drying and fermentation of smoking or chewing, smoked and smokeless tobacco usage both have features similar to each other and can carry significant health risks (Critchley, 2003; West, 2017). Stop smoking usually involves an intention not to smoke any cigarettes in time, followed by self-conscious resistance to the urge to smoke resulting in a period of abstinence. There is no agreement criterion for the term “Quit Rate” to be clear about how long the abstinence period has been. It
is estimated that approximately one billion tobacco smokers worldwide (Haber et al., 2015) amounting to be approx 30% men and 7% of women (Gowing et al., 2015). The most common age of the first trying a cigarette in developed countries is in the early '20s (Dierker et al., 2008). Such a younger age incidence of tobacco/smoking is a factor to be looked into in the future. As long as they continue to smoke, they enjoy the habit and develop a very high dependence on tobacco. It is necessary to counsel them and advise them to quit the habit at the earliest.

‘Nicotine’ in tobacco is the main etiological factor causing dependence (AL-Bashaireh et al., 2018). The psychopharmacology of cigarette/tobacco addiction is very complex and far from full understanding. Quit attempts by a tapering method involving low and gradual reduction are less likely to succeed than that of cold turkey method involving quitting abruptly, even after controlling statistically for measures of tobacco addiction (Lindson-Hawley et al., 2016). The most common reason for reported tobacco usage is stress relief and enjoyment (Fidler and West, 2009) even though the smokers are aware of the ill-effects, they continue to enjoy it. On intake of tobacco, there is a stimulation of nicotinic cholinergic receptors which releases a variety of neurotransmitters in the brain. One of them, dopamine, which has a very pleasurable experience and is critical for the reinforcing effects of nicotine among drug abusers and people who use tobacco. Nicotine induces pleasure and reduces stress, anxiety and also causes addiction in terms of physical and psychological dependence.

Smokers use it to modulate levels of arousal and to have a pleasurable experience. Many habitual smokers who attempt to quit the habit experienced significant withdrawal symptoms during the first stages of abstinence and there’s evidence that these symptoms contribute to relapse. Cessation of smoking causes the emergence of withdrawal symptoms: irritability, depressed mood, restlessness, and anxiety.

Although evidence-based recommendations indicate that smoking cessation programs are useful in helping smokers to quit (Clinical Practice Guideline, 2008) the powerful addictive qualities of nicotine creates a huge hurdle, even for those with a strong desire to quit. Once established; smoking is a very difficult addiction to break. Many quitting smokers persist in tobacco use for several years and go through cycles of multiple periods of remission and relapse. It has been shown that approximately 80% of smokers who attempt to quit on their experience relapse within the first month of abstinence, and only about 3–5 % remain abstinent at 6 months (Hughes, 2007).

The role of the dentist lies in creating awareness and telling the patient “ill-effects” of smoking and the negative impact of life. However, abstinence from the habit at one go is not an easy task. With subsequent visits and assistance by the dentist can help complete abstinence. Counselling with medication is more effective when used for treating tobacco dependence. Thus, clinicians should encourage all individuals making a quit attempt by both counselling and medication (Harini and Leelavathi, 2019).

Previously our team had conducted numerous clinical studies (Mathew et al., 2020; Mohapatra et al., 2019), surveys (Neralla et al., 2019; Pavithra and Jayashri, 2019) and original research (Kumar and Preethi, 2017; Kumar and Vijayalakshmi, 2017) over the past 5 years. Now we are focussing on epidemiological studies. The idea for this study stemmed from the current interest in our community. The present study is one such which aimed to find the association between tobacco dependence and quit status.

**MATERIALS AND METHODS**

**Study setting and design**

A retrospective study was conducted by reviewing 86,000 patient records of authors University hospital for a period of nine months from June 2019 to March 2020.

**Sample selection**

About 100 consecutive case records of patients who received tobacco cessation counselling at the University tobacco cessation clinic were retrieved. Case records of patients with complete abstinence for 6 months with signed informed consent were sorted.

**Data Collection**

The total number of relapses during their quitting process was collected from the retrieved case records. The nicotine dependence (both smoking & smokeless) measured using the Fagerstrom nicotine dependence scale (Heatherton et al., 1991) was collected from the case records. A score of 0-2 represents very low dependence, 3-4 represents low dependence, score 5-7 represents moderate dependence and score ≥ 8 represents high dependence. No age and gender restriction placed. Age of the patients was categorized as 11-20 years, 21-30 years, 31-40 years, 41-50 years, 51-60 years and 61-70 years for statistical convenience. The number of relapses was categorized as <2 and ≥2 number of
relapses for statistical purposes.

**Statistical Analysis**

The data was statistically analyzed using the SPSS software (version 20.0). Both descriptive and inferential statistics were employed. Descriptive statistics was done to present socio-demographic details. Chi-square association was done to find a significant association. On the significant association between nicotine dependence and quit rate (number of relapses), binary logistic regression was employed.

**RESULTS AND DISCUSSION**

Figure 1: Cluster bar graph shows gender distribution among different age groups

Figure 2: Cluster bar chart indicating the tobacco dependence score among different age groups

Figure 3: Cluster bar chart indicating the dependence score among males and females

Figure 4: Cluster bar graph showing relapse rate among different age groups

Figure 5: Cluster bar graph showing relapse rate among males and females

Figure 1 shows the distribution of gender based on age groups. Most of the patients were males. It was seen that about 29% of males belonged to the age group 31-40 years. Figure 2 shows the distribu-
tion of tobacco dependence score based on age. It was seen that high nicotine dependence was noted among the subjects of the age group, 41-50 years, 51-60 years (3%). Most of the patients of age group 31-40 years (14%) had very low nicotine dependence.

Figure 3 shows the distribution of dependency score according to gender. It is noted that high dependence was more in males (9%) compared to females (1%). About 35% of the males had a very low tobacco dependence and 37% had low dependence, whereas high dependence was seen among 9% of males. Quit status was considered in terms of the number of relapses. About 11% of patients in the age group 21-30 years and 11% of patients in the age group 31-40 years had more number of relapses (Figure 4). Figure 5 shows the quit rate in terms of relapses across gender. Males (35%) had more relapse rate. About 44.4% of patients with medium dependence had a high number of relapses followed by patients with very low dependence (30.56%) (Figure 6). There was no statistically significant association between tobacco dependence and quit status (p=0.403).

According to this study, it was seen that increased tobacco dependence among the age groups 51-60 years. This finding in contrast with the previous studies (Li et al., 2015; Park et al., 2012) which indicated a high tobacco dependence level in the middle aged current smokers. Another study inconsistency with the present study by Marento et al. (Marinho et al., 2010) reported high tobacco dependence among elderly people. The biological plausibility behind nicotine dependence and age was not fully understood. Desensitization of nicotinic receptors and the effects of psychosocial factors are probably the primary drivers. It was seen that males had reported the highest tobacco dependence. Jorchala et al. and Berliner et al. (Berlin et al., 2003; Torchalla et al., 2011) reported a similar result. This may be because males are exposed to numerous factors that aggravate their stress and to get rid of this, they show increased dependence.

Even though the dependence was high in the 51-60 years age group; a high number of relapses was exhibited in individuals of the middle age group. This can be attributed to the reason for physical and psychological dependence giving them pleasure. A study by Reddy et al. (Reddy et al., 2018) in contrast to this study reported that the quit rate was higher among 35-45 years of age with less number of relapses. In summary, to alleviate the craving or avoid tortuous withdrawal symptoms, smokers have to use more and more tobacco products to maintain the comparatively higher standards of plasma nicotine and this increased level of binding to receptors will aggravate continuously the severity of dependence. High dependence among the elderly could be due to their physical dependence, age-related decline in physical function, illness or fear of being older (Wadgave and Nagesh, 2016).

Higher the dependence lesser the quit status. Nicotine produces higher dependence than any other substance of abuse (Anthony et al., 1994). Unfortunately, quit rates remain low despite the availability of several pharmacological treatments aimed at cessation of tobacco smoking (Haas et al., 2004). Nicotine, a potent agent, is causing physical as well as psychological dependence. Physical drug dependence begins with tolerance, which is when the body adapts to a particular amount of medicine and alcohol and wishes for a better amount to feel the consequences. This increased tolerance can hinder the patient from abstinence from the habit. Psychological dependence is more commonly known as addiction. Addiction is a chronic, relapsing brain disorder and mental illness marked by and repeated drug use despite negative consequences. This psychological drug dependence might strongly instigate the urge to use drugs and struggle with abstinence from the habit despite numerous, repeated attempts. Persistent nicotine use leads to tolerance which is mediated by neuroadaptations occurring in response to chronic nicotine exposure. Thus, within a few hours after cessation from nicotine exposure, withdrawal syndrome emerges characterized by mood depression, irritability, mild to moderate cognitive deficits and other physiological symptoms (Shiffman et al., 2004).

The present study had few limitations where other
potential confounders and effect a modifier which modify the tobacco dependence and quit status was not considered. Generalization of the result remains impossible since the risk prediction was not adjusted for other variables. Further prospective cohort study with snowball sampling is needed to prove the hypothesis.

CONCLUSIONS

Within the limits of this study, it is seen that tobacco dependence is higher for males compared to females. The number of relapses was high among middle-age group individuals. There is a high risk for more relapse in the quitting process for individuals with high tobacco dependence.

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Conflict of Interest

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

REFERENCES

AL-Bashaireh, A. M., Haddad, L. G., Weaver, M., Kelly, D. L., Chengguo, X., Yoon, S. 2018. The Effect of Tobacco Smoking on Musculoskeletal Health: A Systematic Review. Journal of Environmental and Public Health, 2018:1–106.

Berlin, I., Singleton, E. G., Pedarriosse, A.-M., Lancaster, S., Rames, A., Aubin, H.-J., Niaura, R. 2003. The Modified Reasons for Smoking Scale: factorial structure, gender effects and relationship with nicotine dependence and smoking cessation in French smokers*. Addiction, 98(11):1575–1583.

Clinical Practice Guideline 2008. Treating Tobacco Use and Dependence. US Department of Health and Human Services.

Critchley, J. A. 2003. Health effects associated with smokeless tobacco: a systematic review. Thorax, 58(5):435–443.

Dierker, L., He, J., Kalaydjian, A., Swendsen, J., Degenhardt, L., Glantz, M., Conway, K., Anthony, J., Chiu, W. T., Sampson, N. A., Kessler, R., Merikangas, K. 2008. The Importance of Timing of Transitions for Risk of Regular Smoking and Nicotine Dependence. Annals of Behavioral Medicine, 36(1):87–92.

Fidler, J. A., West, R. 2009. Self-perceived smoking motives and their correlates in a general population sample. Nicotine & Tobacco Research, 11(10):1182–1188.

Gowing, L. R., Ali, R. L., Allsop, S., Marsden, J., Turf, E. E., West, R., Witton, J. 2015. Global statistics on addictive behaviours: 2014 status report. Addiction, 110(6):904–919.

Haas, A. L., Muñoz, R. F., Humfleet, G. L., Reus, V. I., Hall, S. M. 2004. Influences of Mood, Depression History, and Treatment Modality on Outcomes in Smoking Cessation. Journal of Consulting and Clinical Psychology, 72(4):563–570.

Haber, P., Day, C., Farrell, M. P. 2015. Addiction Medicine: Principles and Practice. IP Communications pg, 465.

Harini, G., Leelavathi, L. 2019. EBSCO, Nicotine Replacement Therapy for Smoking Cessation- An Overview. 10:3586–3592.

Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., Fagerstrom, K.-O. 1991. The Fagerstrom Test for Nicotine Dependence: a revision of the Fagerstrom Tolerance Questionnaire. Addiction, 86(9):1119–1127.

Hughes, J. 2007. Effects of abstinence from tobacco: Valid symptoms and time course. Nicotine & Tobacco Research, 9(3):315–327.

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.

Li, H., Zhou, Y., Li, S. 2015. The Relationship between Nicotine Dependence and Age among Current Smokers. Iranian journal of public health, 44(4):495–500.

Lindson-Hawley, N., Banting, M., West, R., Michie, S., Shinkins, B., Aveyard, P. 2016. Gradual Versus Abrupt Smoking Cessation. Annals of Internal Medicine, 164(9):585–585.

Marinho, V., Laks, J., Coutinho, E. S. F., Blay, S. L. 2010. Tobacco use among the elderly: a systematic review and meta-analysis. Cadernos de Saúde Pública, 26(12):2213–2233.

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: random-
ized controlled trial. *Clinical Oral Investigations*, 24(9):3275–3280.

Mohapatra, S., Kumar, R. P., Arumugham, I. M., Sakti, D. S., Jayashri, P. 2019. Assessment of Micro-hardness 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.

Park, S., Lee, J. Y., Song, T. M., Cho, S. I. 2012. Age-associated changes in nicotine dependence. *Public Health*, 126(6):482–489.

Pavithra, R. P., Jayashri, P. 2019. Influence of Naturally Occurring Phytochemicals on Oral Health. *Research Journal of Pharmacy and Technology*, 12(8):3979–3979.

Reddy, M., Kanungo, S., Naik, B., Kar, S. 2018. Willingness to quit tobacco smoking and its correlates among Indian smokers - Findings from Global Adult Tobacco Survey India. *Journal of Family Medicine and Primary Care*, 7(6):1353–1353.

Shiffman, S., West, R., Gilbert, D. 2004. Recommendation for the assessment of tobacco craving and withdrawal in smoking cessation trials. *Nicotine & Tobacco Research*, 6(4):599–614.

Torchalla, I., Okoli, C. T. C., Malchy, L., Johnson, J. L. 2011. Nicotine dependence and gender differences in smokers accessing community mental health services. *Journal of Psychiatric and Mental Health Nursing*, 18(4):349–358.

Wadgave, U., Nagesh, L. 2016. Nicotine Replacement Therapy : An Overview. *International Journal of Health Sciences*, 10(3):407–416.

West, R. 2017. Tobacco smoking: Health impact, prevalence, correlates and interventions. *Psychology & Health*, 32(8):1018–1036.