

# Physical and Psychological Dependence of Smokeless and Smoked Tobacco

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## ABSTRACT

**Introduction:** Worldwide tobacco usage is considered to be the most pervasive addictive behaviour, which eventually leads to physical and psychological dependence on nicotine.

**Aim:** The present study was conducted to measure the physical and psychological dependence of smoked and smokeless tobacco.

**Materials and Methods:** It was a questionnaire based survey in which 500 smokeless and 500 smoking forms of tobacco users participated. A standard questionnaire format of modified Fagerstrom Test for Nicotine Dependence (mFTND) for physical dependence and American psychiatric association scale for psychological dependence was given to each subject to answer. The total score was calculated for each subject which evaluated the physical and psychological dependence on smoked and smokeless tobacco. Descriptive analysis was done to check the prevalence of physical and psychological dependence. Chi-

squared test was used to assess associations of age, gender and education in study subjects.

**Results:** The study data revealed that the tobacco chewing habit was more common in males than in females. According to mFTND score for smokeless tobacco users, 16.3% males and 6.7% females and for smoked tobacco users, 35.65% males and 50% females were highly dependent. On using American psychological scale for nicotine dependence for smokeless tobacco users, 66.42% males and 56.17% females were psychologically dependent whereas for smoked tobacco 16.59% males were dependent on smoked tobacco.

**Conclusion:** Our study findings relate to both, the prevalence of smoking and smokeless nicotine dependence. We found that the rate of nicotine dependence was higher in males than in females. The prevalence of nicotine dependence was also higher in subjects with lower education.

**Keywords:** Nicotine, Nicotine dependence, Tobacco use disorder

## INTRODUCTION

"If you can measure the problem than half of the problem is solved" this phrase is true in case of psychological problem [1]. It has been well known that tobacco use in smoked as well as smokeless form results in numerous physical illnesses [2]. In cases of tobacco, illegal drugs, alcohol users psychological problems is observed [1]. Use of tobacco remains leading cause of death worldwide [3]. There are nearly 1.2 billion users of nicotine and tobacco products in world [4]. In developing countries like India tobacco remains leading cause of death [5]. Smoked and smokeless forms are major form of tobacco which are used widely. Smoking form includes bidi, cigarette, hookah etc. Smokeless form includes tobacco chewing, pan, pan masala or gutakha (tobacco with areca nut), mishri etc. [1]. Tobacco users are less physically fit when compared with non tobacco users. Physical dependence on tobacco results in shortness of breath, phlegm production, wheezing etc. [6]. According to Global Adult Tobacco Survey (GATS) 2009-2010 in India, prevalence of tobacco use in any form was about 35% (274.9 million), among which around 21% adults were addicted to smokeless form, about 9% to smoked and about 5% to both [7]. Study results by Jain R et al., in 2013 determined that in India prevalence of current tobacco use was about 55.8% [4]. During 1998-2005 use of tobacco among 15-54 years old has increased from 47.4% to 61.8% in rural areas and from 33.6% to 50.3% in urban areas of India [8]. It has been estimated that about eight million people will likely be killed from tobacco by 2030, worldwide [7].

Nicotine is main psychoactive ingredient in tobacco which causes mood alteration, irritability, temporary changes in brain which makes people to use it more and more [9]. Diagnostic and Statistical Manual

of Mental disorders, fourth revision (DSM-IV) TR (Text Revision) in 2000 listed nicotine related disorders in mental disorders American psychiatric association [10]. It states that prolonged heavy use of nicotine is required before psychologic dependence can occur. Tobacco in any form smoking or chewing results in nicotine dependence which is complex syndrome involving physical, psychological and behavioral process [1]. Smoking initiation largely occurs before 18 years of age [11]. As the age advances the grown up individuals becomes relatively invulnerable to the marketing and promotion of cigarettes [12-14].

Now-a-days, nicotine dependence is widely recognised as a chronic relapsing disease, which is characterised by craving, and feeling to use tobacco, withdrawal symptoms during periods of abstinence, increased quantity. Nicotine dependency is independent of frequency of smoking [6]. Smokeless form of tobacco reduces boredom and causes intellectual stimulation [15]. According to recent evidences, both physiological and psychological tobacco dependency can be observed due to irregular, infrequent and sporadic use of tobacco [9]. Craving is a predictor for relapse. It has been estimated that about 75-85% of the smokers would like to quit and less than 50% are able to succeed in their attempts. Pharmacological interventions can be considered successful if they effectively reduce craving for tobacco usage and helps preventing relapse of the habit [16, 17].

Most of these tobacco users visit a physician every year, and hence these physicians have a substantial opportunity to influence their behaviour [5]. There should be a vital role of clinicians and dental team in tobacco cessation by suggesting various ways of cessation. Quitting programmes need to measure physical and psychological nicotine dependence among adults in order to serve for more

beneficial counselling for the addicted patients. Thus the aim of our study was to measure the physical and psychological nicotine dependence among adult tobacco users.

## MATERIALS AND METHODS

This cross-sectional questionnaire survey was conducted in Datta Meghe Institute of Medical Sciences, Wardha, Maharashtra, India. Ethical clearance was obtained from the Institutional Review Board. Patients visiting the institute with a history of tobacco use for at least one year, above 18 years of age, literate enough to read and answer the questionnaire and mentally sound were selected, and the illiterate subjects were assisted by the authors by asking questions and helping them in filling the questionnaire for the study from November 2016 to February 2017.

Since the study was aimed to evaluate the physical and psychological dependency of nicotine among the tobacco users, the sample size was calculated based on the prevalence of tobacco habit in Indian context. The average anticipated population proportion of tobacco consumption among adult is 60% [4,11]. With absolute precision of 5% points, 95% confidence level and 80% power of test; using n master sample size calculator, the sample size was calculated as total of 1000 sample .

A questionnaire with 13 items on physical and psychological nicotine dependence was used. To measure the physical dependence a Marathi translation of mFTND was used and to measure the psychological dependence Marathi translation of questions based on the American psychiatric association's diagnostic criteria of nicotine abuse was used [10,18]. The questions were translated to Marathi by two individuals fluent with both English and Marathi and then back translated to English to check the validity. The questionnaire was self administered and closed ended. The questionnaire consisted of six questions to measure physical dependency and seven questions to measure psychological dependency of nicotine among tobacco users.

Prior to the start of the study, the translated questionnaire was pilot tested on 50 study subjects who were not included in the main sample of 1000 study subjects. Cronbach's Alpha test was used to check the validity of the questionnaire, which was found 0.82 for physical dependency and for psychological dependency 0.81. Modifications in questionnaire were made based on the responses obtained from the study subjects with the help of experts. The pilot study subjects and the results of the pilot study were not included in the main study, only the reliability and validity was assessed.

Questions regarding their demographic data (age, gender, education) were asked. The subjects were informed about the purpose of study and those who were willing to participate were given about 20-25 minutes to fill and return the questionnaire. The

tobacco users from the sample were divided into four categories based on physical nicotine dependence according to their mFTND score; 1: null dependence (0); 2: low (1 to 3); 3: moderate (4 to 6); 4: high (7 to 10). Similarly, they were divided into two categories of psychological nicotine dependence (I: non psychological nicotine dependence and II: psychological nicotine dependence) by fulfilling or not fulfilling at least three of the diagnostic criteria (American psychiatric association, 1994) [10].

## STATISTICAL ANALYSIS

The data were entered into the MS Excel (MS Office version 2007 developed by Microsoft, Redmond, WA) and Intercooled STATA version 9.2 (StataCorp, TX, USA) was used to perform statistical analysis. Descriptive analysis was done to know the prevalence of physical and psychological dependence. Chi-square test was used to assess associations of age, gender and education of study subjects.

## RESULTS

Among all study subjects, a total of 899 (89.9%) respondents were males, while 101 (10.1%) respondents were females. According to mFTND score for smokeless tobacco users, physical dependencies in males was 33.09% and in females was 52.80%, which was low, 50.60% males and 40.44% females were moderately dependent and 16.3% males and 6.7% females were highly dependent. According to mFTND score for smoked tobacco users, physical dependence in males was 7.37% and in females was 0% which was low, 56.96% males and 50% females were moderately dependent, and 35.65% males and 50% females were highly dependent [Table/Fig-1].

On using American psychological scale for nicotine dependence for smokeless tobacco users, we measured psychological dependence among males and females according to which 33.57% males and 43.82% females were psychologically non dependent on smokeless tobacco. A total of 66.42% males and 56.17% females were psychologically dependent on smokeless tobacco. On using American psychological scale for nicotine dependence for smoked tobacco users, we measured psychological dependence among males and females according to which 83.40% males and 100% females were psychological non dependent on smoked tobacco and 16.59% males were psychologically dependent on smoked tobacco [Table/Fig-2].

Correlation analysis between physical and psychological dependence with the demographic variables revealed age and education were significantly associated with physical and psychological dependence with the smoked and smokeless kind of tobacco form [Table/Fig-3].

S m o k e l e s s	Level of dependency	Gender				Total 500 (100%)		Mean age (in years)	Education			
		Males 411 (100%)		Females 89 (100%)		N	%		Illiterate	1 <sup>st</sup> -10 <sup>th</sup>	11 <sup>th</sup> -12 <sup>th</sup>	UG/PG
		N	%	N	%				N	N	N	N
	Low dependency (0-3)	136	33.09	47	52.80	183	36.6	45.57	33	61	33	23
	Moderate dependency (4-6)	208	50.60	36	40.44	244	48.8	52.09	76	95	39	16
	High dependency (7-10)	67	16.3	6	6.7	73	14.6	50.81	37	53	22	12
S m o k e d	Level of dependency	Gender				Total 500 (100%)		Mean age (in years)	Education			
		Males 488 (100%)		Females 12 (100%)		N	%		Illiterate	1 <sup>st</sup> -10 <sup>th</sup>	11 <sup>th</sup> -12 <sup>th</sup>	UG/PG
		N	%	N	%				N	N	N	N
	Low dependency (0-3)	36	7.37	0	0	36	7.2	45.54	13	34	11	3
	Moderate dependency (4-6)	278	56.96	6	50	284	56.8	54.66	37	111	105	6
	High dependency (7-10)	174	35.65	6	50	180	36	49.75	27	87	63	3

[Table/Fig-1]: Showing physical dependence of smokeless tobacco users.

S m o k e l e s s	Level of dependency	Gender				Total		Mean age (in years)	Education			
		Males 411 (100%)		Females 89 (100%)		500 (100%)			Illiterate	1 <sup>st</sup> -10 <sup>th</sup>	11 <sup>th</sup> -12 <sup>th</sup>	UG/PG
		N	%	N	%	N	%		N	N	N	N
	Non dependent (<3)	138	33.57	39	43.82	177	35.4	45.57	51	79	38	21
	Dependent (>3)	273	66.42	50	56.17	323	64.6	52.09	95	130	56	30

  

S m o k e d	Level of dependency	Gender				Total		Mean age (in years)	Education			
		Males 488 (100%)		Females 12 (100%)		500 (100%)			Illiterate	1 <sup>st</sup> -10 <sup>th</sup>	11 <sup>th</sup> -12 <sup>th</sup>	UG/PG
		N	%	N	%	N	%		N	N	N	N
	Non dependent (<3)	407	83.40	12	100	419	83.8	42.25	55	202	153	07
	Dependent (>3)	81	16.59	0	0	81	16.2	56.38	22	30	26	05

**[Table/Fig-2]:** Psychological dependence of tobacco users.

	Demographic variables	Physical scale		Psychological scale	
		Chi-square test	p-value	Chi-square test	p-value
Smokeless	Age	386.3	0.04*	66.60	0.01*
	Gender	9.465	0.489	12.113	0.97
	Education	90.146	0.043*	59.361	0.014*
Smoked	Age	818.89	0.00*	157.077	0.00*
	Gender	4.95	0.55	1.681	0.195
	Education	57.203	0.00*	9.697	0.021*

**[Table/Fig-3]:** Correlation analysis of demographic variables with physical and psychological dependence among adult tobacco users using chi-square test. p≤0.05 is statistically significant

## DISCUSSION

Our study revealed population with high percentage of physical nicotine dependence in smoked form (36%), which was similar to the dependency level in Greek population (30.2%), USA (36%), China (30%) whereas lower level of physical nicotine dependency was seen in studies conducted in Singapore (4.5%) and Italy (21.7%) [2,3,5,19,20]. The reason for such high prevalence of dependency among Indian population could be the fact that India is 2nd highest consumer of smoked and smokeless tobacco [20]. Other than use of tobacco in smoking or smokeless form, products like mishri, catechu, pan masala, gutkha, gudakhu are also used by rural population [1]. India is 3<sup>rd</sup> largest producer of tobacco and tobacco products like bidi have low taxes and so are also available at very low cost in Indian markets which might also be a possible explanation for high physical dependence [6,21].

Our study documented low percentage of nicotine dependence in female as compared to males, which is also found in other Asian population [18]. In Asian inhabitants according to evidences, it has been observed that male smoking has social acceptance, whereas female smoking has no social acceptance in country like India. Also other studies found in Asia showed over 50% of smoking prevalence in males while in females it is found to be less than 10% [18]. Continuous use of tobacco causes tobacco dependence, this tobacco dependency act as barrier leading to compulsive use of tobacco [21]. The National Family Health Survey (2005-06) estimated high prevalence of tobacco use about 57% of males and 11% of females in the age group of 15-54 years in India [6]. Also, in rural population when doctors approaches females regarding these habit history they feel reluctant and provide with either false data or incomplete information or hide their true dependency which might be another explanation for low dependence among females in our study.

In contrast from the Greek population, the present study showed higher dependency on tobacco among less educated people [3]. Such differences can be attributed to the fact that less educated people might have less awareness regarding health hazards caused

because of tobacco usage. The study participants in the present study were mostly from the rural areas, where the literacy rate is low. According to GATS India (2009-10) survey higher prevalence of tobacco is seen in less educated population than highly educated population as well as higher prevalence of tobacco is found in rural population than urban population [7].

Result from the study showed that prevalence of smokeless tobacco use was highest in age group of 32 to 65 years. Smoking prevalence was most in 24 to 57 years of our study population. Study results according to Leon ED et al., adult males had highest tobacco dependence among age group of 18-65 years [21]. Middle age males have more prevalence for tobacco dependence, which is also found in our study. High physiological dependence seen in mean age of 50 years for smokeless tobacco and 49 years for smoked tobacco. Likewise, psychological dependence is seen in mean age of 52 years and for smokeless tobacco is 56 years.

Prevalence of psychological dependence in our study was found to be 16.59% among smokers. It was found 75.7% in Greek population [3], 57% in USA [6] and Singapore [2]. Lesser dependency was found probably due to variations in the personality and characteristics of Indians. In Asian countries, more than two million people die due to tobacco consumption habits. Tobacco control program are not effective when compared to rate of tobacco consumption by Asian population.

In brief, the present study gives convincing evidence of prevalence of not just physical but also psychological nicotine dependence. This is an alarming sign for a course of action that should be taken by the government to reduce nicotine consumption. About 70% of the tobacco users visit their physicians every year and hence they can play a significant role in manipulating the behaviour of these patients [4]. It will also aid for developing new policies to raise awareness amongst the rural population in India.

## LIMITATION

Some limitations in our study need to be concentrated on. Firstly, as we have already discussed we found less percentage of nicotine dependence in females which may be because in Indian population females do not accept their habit socially, misleading the results of study. Secondly, we included persons above 18 years of age in our study therefore we were unable to find nicotine dependence in adolescents. Psychological symptoms may be different in adolescent and adults. Moreover results may not be generalized to other ethnic group with different characteristic population.

## RECOMMENDATION

In depth understanding of physical and psychological dependence on tobacco is the key factor for successful tobacco cessation activities. This would help the dentist develop tailor made interventions for tobacco cessation for the individual patients which would render very cost effective and significant health gain for tobacco users. Since tobacco is the modern day epidemic, tobacco cessation

should be the part of the core dental curriculum and basic training of all the dental professionals should be compulsory. Even other health professionals should also receive training in tobacco cessation and nicotine replacement therapy should be available at every point of contact of the patient with the health care facilities.

## CONCLUSION

Our study reports findings related to both, the prevalence of smoking and smokeless nicotine dependence. We found that the rate of nicotine dependence is higher in males than in females. The prevalence of nicotine dependence was also higher in subjects with lower education.

It is needful that similar studies be conducted in the near future, in order to track the prevalence of nicotine dependence and to ensure that appropriate intervention and cessation program be conducted.

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