Cross-Sectional Study to Estimate Dependence among Tobacco Smokers Attending a Tertiary Care Government Hospital in Bhavnagar, Western India

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ABSTRACT

Background: India is one of the countries where addiction to tobacco smoking is rampant. The consumption of tobacco products is quite high in the Bhavnagar region in the western part of India.

Methods: We conducted a cross-sectional hospital-based study among 112 current tobacco smokers aged ≥18 years in April-May 2019 at Sir Takhtsinhji hospital in Bhavnagar. Fourteen smokers from each ward of the hospital were enrolled from eight randomly selected wards. Dependence was assessed using the Fagerstrom Test for Nicotine Dependence, with a score of ≥5 labelled as high dependence.

Results: Among the 112 current smokers, 79% (95% confidence interval 70%-85%) were dependent on tobacco smoking. One-fourth of the smokers belonged to the age group of 51-60 years. "Mawa" (a mixture of tobacco, betel nut and lime) was the most commonly consumed smokeless form of tobacco among the smokers. Mean expenditure on tobacco smoking was Indian Rupees 460. Those who had stress had 7 times higher odds (95% CI 3-23) of being dependent on tobacco smoking than their counterparts.

Conclusion: We conclude from the study that patients attending our hospital are highly dependent on tobacco smoking. Tobacco cessation activities in the form of provider-initiated counselling and treatment is warranted. Further research should focus on evaluating the implementation modalities and effectiveness of such provider-initiated activities.

Key Words: Smoking, Dependence, Risk factors, Fagerstrom Test, Nicotine Dependence

INTRODUCTION

Nicotine dependence is a substance abuse disorder involving compulsive drug use despite known health risks.[1] India is the second-largest producer and consumer of tobacco and accounts for approximately one-sixth of the world's tobacco-related deaths.[2] Global Adult Tobacco Survey- 2 of Gujarat (2016-17), revealed that 14.2% of males and 0.7% of females currently smoke tobacco, and 7.7% of adults are addicted to tobacco smoking.[3] Survey carried out in Gujarat found that 14.2% of the population consumed the smoking form of tobacco.[4] Male residing in urban areas preferred smoking form of tobacco while pan masala or "gutkha" and "bidis" were common in rural areas.[5]

A survey carried out in India reported 10% of males and 3% of females were dependent on tobacco smoking.[6] Study in Pune reported 47% of smokers being highly dependent on tobacco smoking.[7]

The compound mechanism of nicotine dependency makes it challenging to evaluate dependence or progress towards dependence.[8] In recent times, Nicotine dependence is widely considered as a chronic and relapsing disease.[9]

Previous study reported high Dependence level between 6.1% to 89.5%. [8,10-16]

In our study setting, a "tamaku-mukti sena" (tobacco liberation army) is functional for de-addiction. Medical college initiated this concept to make active involvement of medical students for the prevention of tobacco in any form in the college and in the hospital campus. The assessment of nicotine dependence helps to predict whether the smoker experiences nicotine withdrawal symptoms and is a guide to the intensity of treatment required.

Current study examines effect of smoking form of tobacco with specific reasons as smoking creates adverse health consequences for non-smokers, whereas oral tobacco use does not, the control of smoking is far more feasible under current administrative and regulatory structures than is the control of a large and informal market with many sub-suppliers for oral tobacco and enough published literature is available on smokeless tobacco and dependence associated with it, whereas there is a dearth of evidence on smoking forms of tobacco in Gujarat. Despite existing legislation on tobacco smoking, the prevalence of smoking 46.2%[17] in Gujarat.

With the aforementioned background and the perceived need to generate evidence in Gujarat, the current study estimated the dependence among smokers and determined the predictors associated with dependence among smokers at tertiary care hospital in Bhavnagar (Gujarat, India).

METHODS

Study design, duration, and setting: Current study was hospital-based cross sectional carried out during April and May 2019 at Sir Takhtsinhji Hospital in Bhavnagar city. Sir Takhtsinhji Hospital is a tertiary-level Government Medical College-attached 750-bedded hospital. It caters to patients from Bhavnagar, Amreli, Gir-Somnath, Botad, and Surendranagar districts. Consumption of tobacco is quite high in these districts, collectively known as the "Saurashtra" region in the western part of India. Bhavnagar city has a population of 28.8 lakh as per census 2011. It has an overall literacy rate of 74.04%.[18]

Inclusion criteria: All current smokers (those who are still smoking or stopped smoking for less than one year)[19], aged ≥18 years and giving informed consent to participate in the study, were included in the study.

Sample size: The previous study reported the prevalence of high dependency among smokers residing in Bengaluru as 48.5%.[16], with confidence interval of 95% and 10% allowable error (E) sample size was determined as 96 inclusive of 10% non-response rate. In the current study, a total of 112 study subjects were enrolled.

Sampling technique: Eight in-patient department (IPD) were selected randomly out of nine and from each IPD, 14 smokers were included in the study. Each IPD ward was visited and patients and relatives were asked about their smoking habit, among which current smokers were identified and enrolled in study. Efforts were made to enrolled 14 smokers from each IPD and multiple visits (2-3) were made to each department until 14 smokers were enrolled in the study. The confidentiality of participants was maintained. Interviews of participants were taken in the vernacular language.

Data Collection: After obtaining informed consent, the study participants were interviewed face-to-face by the principal investigator (first author) using a validated questionnaire, along with socio-demographic and background characteristics (age, gender, marital status, religion, smoking behaviours - years of smoking, number of pack per day and age at smoking initiation).

Study tool: As nicotine is one of the main risk factors in smoking addiction and in current study, the Fagerstrom Test for Nicotine Dependence (FTND)[13] tool was used to assess the dependency level. This is a validated tool for assessing the intensity of physical addiction to nicotine. The test was designed to provide an ordinal measure of nicotine dependence related to cigarette smoking. It contains six items that evaluate the quantity of cigarette consumption, the compulsion to use and dependence. The FTND yes/no items were scored from 0 to 1 and multiple-choice items are scored from 0 to 3.[20] Items were summed to yield a total score of 0-10. The higher the total Fagerstrom score, the more intense is the patient's physical dependence on nicotine. Scoring system of this tool was taken from the previous study where the score of ≥5 was labelled as high dependence and score of <5 was labelled as low dependence.[21]

Variables: The outcome variable was dichotomous with an FTND score of ≥5 labelled as a high dependence and < 5 as a low dependence. The predictors under assessment were education, age of initiation of tobacco smoking, religion, the number of bidis smoked per day and stress describe in number and percentage.

Statistical analysis: Categorical data were expressed in proportions, while continuous data were expressed in mean values. In the contingency tables, the significance of the association between the two attributes was analysed using the Pearson chi-squared ($\chi2$) test and for all the tests a p value of <0.05 was considered significant. Also, odds ratio was calculated for various exposure variables with their 95% confidence intervals.

Ethical issue: Written informed consent was taken from the individuals. The name of the study participants was kept confidential and was not disclosed to anyone. The ethical clearance for the present study was obtained from the Ethics Committee of Government Medical College Bhavnagar.

RESULTS

Among the 112 study participants, 25% belonged to the age group of 51-60 years, followed by age group of 41-50 years (Table 1). It was observed that most of respondents (62.5 %) were educated up to the primary level of education followed by secondary, illiterate, higher secondary and more. Most participants were labourers (56.3%), 95% were married and 91.96% belonged to the Hindu family.

Concerning smoking behaviour of the study subjects, most of the smokers started smoking within 5 minutes after waking up in the morning (table 2). Most of the study subjects (38.40%) smoked 10 or fewer bidis. Most study participants (71.40%) were keep smoking even if they were ill. In the current study, 79% (95% CI 70%-85%) of study subjects were highly dependent on tobacco smoking.

Also, the exposure variables such as number of bidi smoking per day (p<0.05, OR=0.18 (95% C.I.: 0.052-0.67)), Stress (p<0.001, OR=7.73 (95% C.I.: 2.6-22.7) and age at initiation of smoking (p < 0.05, OR=3.59 (95% C.I.: 0.099-13.03)) were significantly associated with high dependence (Table3). Smokers with high dependence had 7 times (95% C.I.: 2.6-22.7) higher chances of having stress as compared to smokers with low dependence. Multiple logistic regression was carried out by enter method considering FTND score as the dependent variable (with 2 outcomes namely high dependence and low dependence) and entering the predictor variables as the independent variables. Multivariate regression analysis showed that the independent factors associated (p<0.05) with the high dependence were stress (P=0.04, adjusted odd ratio [OR] 1.378), No of cigarette a day smoke (p=0.021 adjusted [OR] 0.120), Age at initiation of smoking (P=0.026 adjusted [OR]0.932), Knowledge of smoking harm other (P=<0.001, adjusted [OR] 11.929). (Table 4)

DISCUSSION

Substance abuse in any forms are hazards and it must be addressed strictly to minimize its worst outcome to society. Many social, economic and political factors have contributed to the global spread of tobacco consumption.[22] India was among the first few countries to sign and ratify the WHO Framework Convention on Tobacco Control.[23] On the legal aspect, the Government of India legislated the comprehensive 'Cigarette and other Tobacco Product Act, 2003' (COTPA 2003) that came in enforcement from May 2004.[24]

Table 1: Socio- demographic Profile of study participants in Government Medical College-attached hospital, Bhavnagar during April-May 2019 (N=112)

Socio demographic factors	Participants (%)
Age (In year)	
18-30	18 (16.07)
31-40	25 (22.32)
41-50	27 (24.10)
51-60	28 (25.00)
61-70	12 (10.71)
71-80	2 (1.18)
Education	
Illiterate	15 (13.39)
Primary	70 (62.50)
Secondary	21 (18.75)
Higher secondary and more	6 (5.35)
Occupation	
Unemployed	2 (1.80)
Labour	63 (56.30)
Farmer	23 (20.50)
Driver	23 (20.5)
Teacher	1 (0.9)
Marital status	
Married	106 (94.64)
Unmarried	6 (5.35)
Religion	
Hindu	103 (91.96)
Muslim	9(8.03)

Table 2: 6-items of Fagerstrom Test for Nicotine Dependence of responders (N=112)

FTND item	Participants (%)
1. How soon after you wake do you smoke your first cigarette?	
31-60min	27(24.10)
5-30 min	62(55.40)
Within 5 min	23(20.50)
2. Do you find it difficult to refrain from smoking in places where it is forbidden, such as the library, theatre, or doctors' office	
Yes	86(76.80)
No	26(23.20)
3. Which cigarette would you hate most to give up?	
Morning	86(76.80)
Any other	26(23.20)
4. How many cigarettes per day do you smoke?	
10 or less	43(38.40)
11-20	28(25)
21-30	33(29.50)
30 or more	8(7.10)
5. Do you smoke more frequently during the first hours after awakening than during the rest of the day?	
Yes	90(80.40)
No	22(19.60)
6. Do you smoke even if you are so ill that you are in bed most of the day?	
Yes	80(71.40)
No	32(28.60)

Table 3: Association of different variables with nicotine dependence (N=112)

Variables	Dependency		Total (%)	P Value	OR	95% CI
	High dependency	Low dependency				
Religion						
Hindu	81(78.64%)	22(21.36%)	103(100%)	0.952	1.06	0.203-5.42
Muslim	7(77.78%)	2(22.22%)	9(100%)			
No. of bidi smoking per day*						
<20	50(70.42%)	21(29.58%)	71(100%)	0.005	0.18	0.052-0.67
>20	38(92.68%)	3(7.32%)	41(100%)			
Marital status						
Married	85(80.19%)	21(19.81%)	106(100%)	0.80	4.04	0.76-21.50
Unmarried	3(50%)	3(50%)	6(100%)			
Stress*						
Yes	59(92.18%)	5(7.82%)	64(100%)	<0.001	7.731	2.623-22.783
No	29(60.41%)	19(39.59%)	48(100%)			
Age at initiation of smoking (in years)						
<30	82(81.20%)	19(18.80%)	101(100%)	0.041	3.59	0.099-13.0325
>30	6(54.50%)	5(45.50%)	11(100%)			
Education						
Illiterate	11(73.3%)	4(26.7%)	15(100%)	0.595	0.71	0.20-2.84
Literate	77(79.4%)	20(20.6%)	97(100%)			
Total duration of smoking (in years)						
>40	19(86.36%)	3(13.64%)	22	0.32	1.92	0.51-7.15
<40	69(76.67%)	21(23.33%)	90			

#OR= Odd ratio, CI= confidence interval; *Significant at p<0.05

Table 4: Factors associated with dependence in the multivariate regression analysis

Variables	Crude OR	P value	Adjusted OR	P value
Age	3.667	<0.001	1.008	0.756
Marital status	4.048	0.101	7.403	0.101
Age of initiation of smoking	0.009	0.937	0.932	0.026
Smoking habit of family member	1.314	0.596		
Smoking habit of friend	0.940	0.908		
Education	1.40	0.597		
Income	1	0.085	1	0.633
Total No of cigarette a day smoke	0.011	0.188	0.120	0.021
Knowledge of smoking harm other	<0.001	9.714	11.929	<0.01
Stress	11.8	<0.001	1.378	0.04

This is first study that examine the dependency on tobacco smoking in Bhavnagar. The present study attempted to highlight the dependence on tobacco smoking among patients and relatives attending Government Medical College attached hospital in Bhavnagar**.** In the present study, the mean age of study participants was 46 years and similar findings were noted by study undertaken in Estonia, and North India. [25,13,15] Our result may seem to differ with study carried out in West Bengal in 2019 among adolescent study population in which mean age of the study population was 15.9 years. [26] we include all smokers (≥18 year) visited Government Medical College Attached hospital Bhavnagar in our study while they included only adolescent population. Contrast result also found in and studies carried out in Delhi among industrial workers and construction site workers.[27,28]

The Nicotine content in a rod of cigarettes varied from 5.7mg to 13 mg and in a packet of gutkha or khaini from 1.7 mg to 76.2 mg.[29] Low level of nicotine contribute to gradual dependence, while excess nicotine can lead to immediate dependence. The odds ratio for developing Nicotine dependence in-creased after five years of use in smokeless tobacco users when compared to 10 years of smokers probably due to this reason.[27] It is implied that because of these reasons in our study middle-aged smokers were found to be highly dependent.

In the present study, the mean age of initiation of tobacco smoking was 19 years. Almost similar result found in studies carried out in different study settings such as North India, Bhavnagar, Delhi, Ranchi, Bangalore, Pondicherry and Thanjuvar.[30,15,21,31,28,32,33] However Bhavesh Modi *et al* study was conducted in the urban area of Jamnagar, revealed that the mean age of tobacco initiation was found to be 27 years.[34] Results emphasize that the early initiation of tobacco consumption might be due to educational stress, lack of awareness, promotion through advertising and any family member or peer pressure who has a habit of tobacco smoking.

In the current study, the mean FTND score was observed 6.07, which is match with study conducted in Kerala, West Bengal and Ranchi.[10,35,30]. Other studies has identified FTND score ranges from 1.8 to 4.65.[13,36,26,37,38,27].

In the context of dependency, 78.57% (four-fifth) study population were highly dependent on tobacco smoking. Study carried out in different set up found a high dependence level from 13.6% to 66% in their respective studies.[31,16,8,39,40,28,12,11] In our study, most smokers started smoking within 5 minutes after waking up in the morning indicating that a quicker time to smoking in the morning suggests higher dependence. In comparison with low dependency, low dependency assesses by different authors in their study was found from 18.4% to 75.8%. [41,37,35,31,11] Another Gopal Chawla *et al* study carried out in 2014 on nicotine dependence and readiness to quit reported that smokers, who had a willingness to quit (according to Prochaska and DiClemente's model), were followed from the pre-contemplation phase to the preparation phase of quitting and it was found that the smoking dependency level showed a downward trend.[15]

In our study site lacked a sampling frame for the current smoking population so we use purposive sampling method and because of this reason our study found high dependence compare to above mention studies. The difference in dependence level in above mention studies could be due to different methodology, study settings and different study population. Apart from these reasons, different socioeconomic conditions, culture and beliefs which favours the addiction among smokers might lead to dependence to tobacco smoking. In the present study, high dependency might be due to risk factors such as stress, occupation, consumption of the number of bidi smoking per day, low education, educational stress, and peer pressure and awareness level of health hazards of smoking.

The current study revealed that the most common co-addiction among the study population was consuming "Mawa" (29.46%) which is a mixture of tobacco, betel nut and lime followed by "Gutkha" (Containing areca nut and lime) (8.04%) followed by alcohol (1.78%). Mean expenditure on tobacco smoking was found to be 460 INR however, the Global Adult Tobacco survey 2 revealed that the mean expenditure on bidi smoking (for daily bidi smokers) was 284.1 INR.[3]

Rajesh kumar et al study reported 76.6% high dependency and study finding suggest counselling on tobacco dependency and appropriate treatment plan. [42] Study done in north India call for higher attention of the treatment provider among the nicotine dependent study subjects.[43] Ibrahim et al study was conducted in the Quit Smoking Clinic and counselling were done by the physician and the pharmacist with gum and patch. Study found that the highest rate found in counselling module, followed by counselling with gum and patch module and, counselling with gum module. The study also found significant correlation between success rate and modules of intervention and total of visits to the Quit Smoking Clinic.[44] D'Souza et al study focus on counselling and nicotine replacement therapy.[45] Kristin V Carson et al study on interventions for smoking cessation in indigenous population included randomized and non-randomized controlled trials for smoking cessation interventions. Study result evidenced that Smoking cessation data were pooled across all studies producing a statistically and clinically significant effect in favors of the intervention (risk ratio 1.43, 95%CI 1.03 to 1.98, p=0.032).[46]

In our hospital we can start a de-addiction clinic integrated with psychiatry department with involvement of a general physician and counselor. Counselor will counsel the smokers who comes with dependence of tobacco smoking and if needed, they can be given other modes of treatment. Smokers will be followed monthly to assess dependence level and after cessation of smoking if withdrawal symptoms are there, they can be given nicotine replacement therapy.

Our study had limitations such as no female representation; stress level was not assessed with any standard tool and tried to assess generalized stress level amongst study subjects. In sample size calculation, we have taken 20% absolute precision (that is, 10% on either side of the estimate), which is quite high, making us conduct the study on a small sample. Finally, since the sampling was also purposive, generalizations to any other hospital setting or populations is questionable.

CONCLUSION

We conclude from the study that four out of five current smokers attending our hospital were highly dependent. Stress, number of bidi smoked per day and early initiation of smoking were reported to be independently associated with nicotine dependence. Motivational interview and family counselling beneficial in quitting tobacco. Tobacco cessation activities in the form of provider-initiated counselling and treatment is warranted. Further research should focus on evaluating the implementation modalities and effectiveness of such provider-initiated activities.

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