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Research Article

A Study to Assess and Evaluate the Degree of Nicotine Dependence due to Smoking among Adults in Rural Part of North India

Virinder Gill[1], Kavisha Kapoor Lal[2], Dhruvendra Lal[3], Charanjit Singh[4]

[1]Assistant Professor, Department of Community Medicine, Gian Sagar, Hospital & Medical College, Rajpura, Punjab, India.
[2]Senior Lecturer, Department of Periodontics, Himachal Dental College, Sunder Nagar, Himachal Pradesh, India.
[3]Assistant Professor, Department of Community Medicine, Dr B R Ambedkar State Institute of Medical Science, Mohali, Punjab, India.
[4]Senior Resident, Department of Paediatric and Preventive Dentistry, Desh Bhagat Dental College, Mandi Gobindgarh, India.
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I N F O

Corresponding Author:
Dhruvendra Lal, Assistant Professor, Department of Community Medicine, Dr B R Ambedkar State Institute of Medical Science, Mohali, Punjab, India.
E-mail Id:
drdhruvlal@gmail.com
Orcid Id:
https://orcid.org/0000-0001-6973-9311
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A B S T R A C T

Introduction: Nicotine is considered the most active constituent in tobacco which gets absorbed through lung alveoli. It creates a pleasant feeling and mood elevation which is the most common cause of addiction among smokers.

Methodology: A cross-sectional study was conducted in which 807 male participants were selected using non-random sampling. The main objective of the study was to assess and evaluate the degree of nicotine dependence among young adults in rural Ludhiana.

Results: The prevalence of smoking was 20.44%. Out of these, 47.24% had low nicotine dependence, 42.51% had moderate dependence, and 10.23% were highly nicotine dependent.

Conclusion: Nicotine dependence was prevalent among young male smokers. This dependence was significantly associated with age, socio-economic status, and duration of smoking.

Keywords: Smoking, Nicotine, Addiction, Dependence

Introduction

Smoking is one of the primary causes of death globally. India has accounted almost for 275 million tobacco users, out of which, 40% are using smoke less tobacco[1] and the remaining are smoking tobacco. Cigarette smoke contains multiple toxins, for instance, carbon monoxide, nitrosamines and nicotine.[2]

One of the addictive substances in tobacco is nicotine which is absorbed through lung alveoli and also via the oral mucosa in such quantities as may produce a pharmacological effect.[2] A report published in the US in the year 1988 described nicotine addiction and drug dependence as a highly out of control or obsessive utilisation of a psychoactive drug that is augmented by the impact of that drug.[3,4]

Tobacco addiction has its roots hidden in the teenage period of one's life. Many studies showed that people start smoking during their teenage years and by the time they realise how deadly it is, they have already been addicted to it.[5]

Regular use of nicotine through smoking leads to the release of dopamine which prompts the brain to repeat the same behaviour i.e. smoking over n over again. This phenomenon caused by nicotine is known as reinforcement.[6] Nicotine is a very addictive substance with habitual users having a

craving for this chemical and desiring repeated nicotine's effect. Nicotine creates a feeling of pleasure and a sense of euphoria which is the most common cause of addiction among smokers.[7]

Nicotine addiction may have the following signs and symptoms in a person:

- Incompetence to avoid using tobacco products
- Withdrawal symptoms (having urges or cravings to smoke, feeling irritated, grouchy or upset, feeling hungrier or gaining weight), when nicotine is avoided
- An inclination towards smoking even when adverse health conditions come up
- Using tobacco products even if it end angers life[7]

Tobacco has nicotine, which is a carcinogen. Apart from this, tobacco also contains other harmful chemicals which include almost 4000 chemicals that have physical, mental, and psychological effects. Tobacco use is a risk factor and causes serious health conditions, like lung cancer, emphysema, and chronic bronchitis.[7]

Nicotine dependence treatments need a multi-dimensional technique involving guidance, support groups, behavioural therapy, and medication.[8]

Thus, smoking is a big problem and has been found to be addictive mainly because of nicotine which drives a thrush of dependency in one's life. The present study describes and evaluates the dependency caused by nicotine in smokers in the rural part of north India.

Aims and Objectives

- To assess and evaluate the degree of nicotine dependence amongst young male smokers in the rural part of north India
- To find the association between various demographic/socio-economic variables and nicotine dependence

Material and Method

This study is a community-based cross-sectional study conducted in the rural part of north India (Ludhiana). It was conducted on adult males who were aged between 18 and 30 years. This study was conducted over a period of three years from 2015 to 2018.

Inclusion Criteria

All male adults who were aged between 18 and 30 years and gave verbal consent to participate in the study.

Exclusion Criteria

Males that weren't falling in the age group of 18-30 years and those who did not give verbal consent were excluded from the study. All females were excluded from this study because of the social taboo in rural parts of Punjab.

The study was approved by the research committee and an ethical waiver was given as it did not involve any intervention.

Data collection was done by interview method using a pre-designed questionnaire. All participants were assured that anonymity of each one of them shall be maintained throughout this research.

As per the WHO report on the Global epidemic 2013, the prevalence of smoking in India among young adults was found to be 14%. The prevalence of smoking as per the Global Adult Tobacco Survey 2016-17 ranged from 10% to 14% from 2009 to 2016.[9,10] The minimum sample size came out to be 756.

Field visits were conducted and a total of 807 participants were included in the study using convenient sampling (non-random sampling) as per the inclusion criteria. The total rural population of Ludhiana at the time of the study was 1429031 which included 753444 males and 675587 females.[11]

Modified Fagerstrom Questionnaire (mFTQ) was used to access the nicotine dependence level.[12] The accuracy of this tool in predicting the outcome of attempts to stop has been proven; that is why it has become the most commonly used quantitative measure of nicotine dependence. A high score indicates greater dependence on tobacco. Usually, the score of smokers is found to be an average of about 4 on this scale. This modified version of the Fagerstrom questionnaire also assesses the level of nicotine dependence among adolescents. This questionnaire is already validated and available free of cost for use.

The parameters which are included in this questionnaire included number of cigarettes smoked per day, inhalation of the smoke, history of smoking after waking up, intention to give up smoking, smoking history in forbidden areas and during illness and desire to smoke during the first 2 hours of the day.[12]

The data were collected by the investigators themselves during field visits and proper training was provided regarding the interview technique which was used to collect the information from participants.

Definitions

Dependence on Nicotine: All those who had a score of less than 4 on Modified Fagerstrom were classified as low dependent while those with a score of 4-7 were moderately dependent, and those with a score of more than 7 were highly dependent.

Ever Smoker: The person who abstained from smoking/chewing tobacco during the past 30 days preceding the survey but had consumed it earlier even once or twice was defined as ever smoker.

Current User: Current smoker was defined as the person

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who had smoked/ chewed tobacco product at least once in the 30 days preceding the survey.

Data Analysis

The completed questionnaires were analysed using appropriate statistical tests using SPSS Version 20 software and Excel. The results were expressed in percentages and Chi Square test was used to get the significance of association.

Results

In this study, smokers were classified into current and ever smokers according to the WHO definition. It was observed that the overall prevalence of smoking came out to be 20.44% out of which, 15.73% were current smokers and 4.70% were ever smokers. The study showed that cigarette is the most common product followed by bidi, hookah, and self-rolled joints. The additional details regarding the prevalence of smoking among the study participants have been mentioned in a previously published study.[13]

Table 1.Smoking Pattern among Current Smokers

Interval of Smoking (hours)	n	%
< 1	23	18.1
2-4	78	61.4
> 4	26	20.3
Time of first cigarette	**n**	**%**
As soon as you get up	45	35.5
Within 30 min of getting up	42	32.8
Later in day	40	31.3
Time of the day you smoke the most	**n**	**%**
Morning	29	22.8
Afternoon	12	9.4
Evening	35	27.6
Night	51	40.1
Place where you smoke	**n**	**%**
Indoors	24	18.9
Outdoors	55	43.3
Work	04	3.1
With company	28	22
Many places	16	12.6
No. of cigarettes per day (CPD)	**n**	**%**
< 2	03	2.5
> 2-4	66	52
> 5	58	45.5

Table 1 shows the pattern of smoking among current smokers. It was observed that maximum (61.4%) among them smoked between 2 to 4 hours interval. 35.5% said they smoked their first cigarette as soon as they got up, while 32.8% smoked within 30 minutes of getting up. It was also observed that 40.1% of them smoked the most during night time. An interesting finding that came out was that 43.3% smoked outdoors. 45.5% of the smokers in our study consumed 5 or more cigarettes per day (CPD).

Table 2.Factors which Trigger Smoking among Current Smokers

Triggering Factor	Frequency	Percentage
Stress	56	44.09
Anger	36	28.3
Need to concentrate	21	16.53
Boredom	16	12.59
Frustration	15	11.81
Wanting to be like others	09	7.08
Recreational purpose	08	6.29
Loneliness	07	5.5
Sadness	03	2.36
Multiple responses	30	23.62

Table 3.Negative Feeling towards Smoking among Current Smokers

Type of Negative Feeling	Number	Percentage
Bad for your health	58	32.9
Expensive	34	19.3
Foul breath	19	10.8
Bad for children in the house	11	6.3
Yellowing of nails and teeth	10	5.7
Disapproval of family, spouse	09	5.1
Bad taste	06	3.4
Dependency	03	1.7
Multiple responses	26	14.8

Table 2 depicts the factors which trigger smoking among current smokers. Stress (44.09%) was the most important triggering factor, followed by anger (28.3%) and the need to concentrate (16.53%). It was observed that 12.59% of the participants smoked when they felt bored. The percentages of smokers who said frustration and being like others were triggering factors were 11.81% and 7.08% respectively. 23.62% of the smokers had multiple triggering factors for smoking.

Table 3 depicts the negative feelings which participants had towards smoking. It was observed that out of the total

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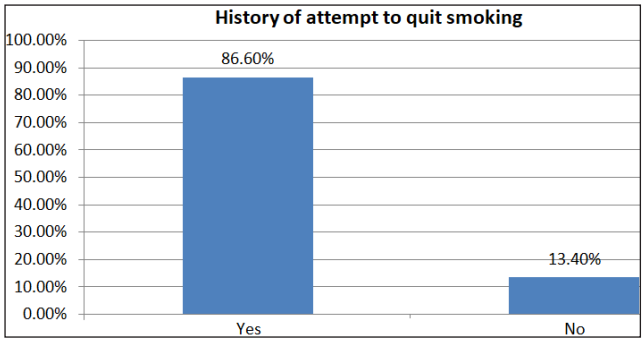

Figure 1.History of Attempt to Quit Smoking among Current Smokers

current smokers, 32.9% did not like smoking because they thought that it was bad for their health, another 19.3% did not like smoking because it was expensive. 10.8% of the students did not like smoking because of foul breath after smoking.

Figure 1 depicts that 86.6% of people tried to quit smoking. Figure 2 shows the reasons why current smokers had taken up this habit of smoking which included stress, strong craving etc.

Problems faced by current smokers when they tried to quit smoking in the past can be well seen in Figure 3. It was observed that 41.81% had problems while concentrating

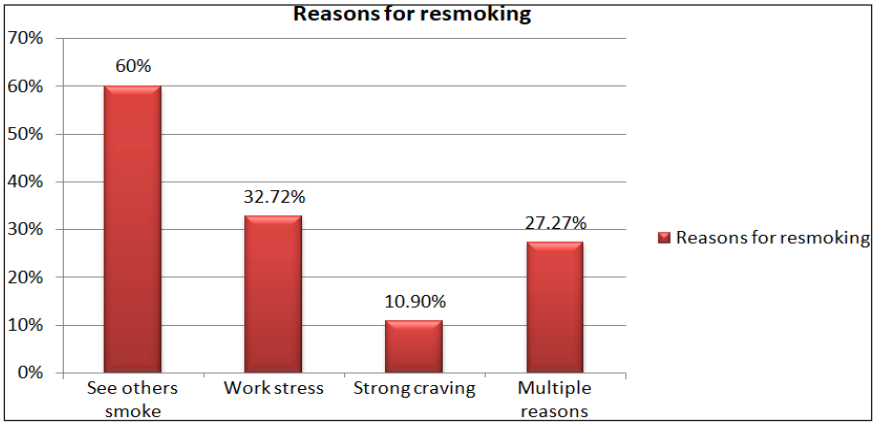

Figure 2.Reasons for Starting to Smoke Again among Current Smokers

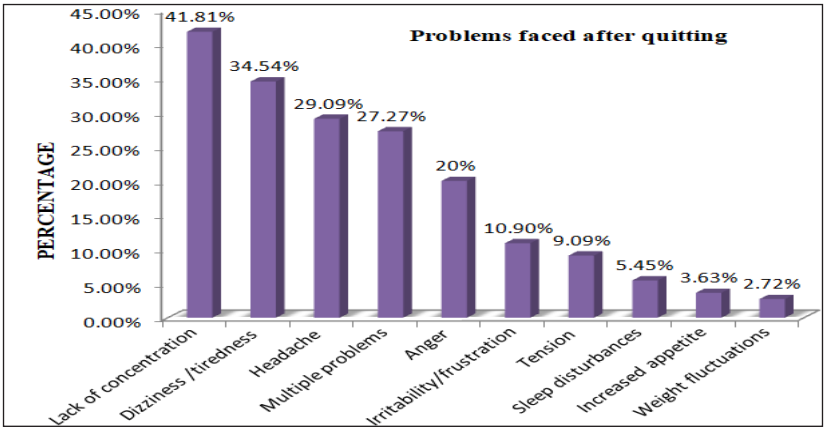

Figure 3.Problems Faced after Quitting

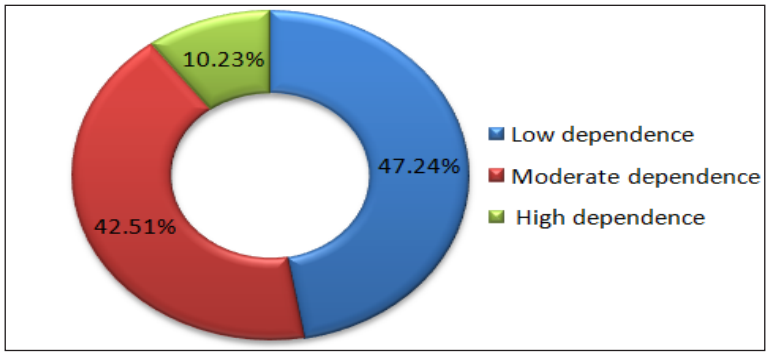

Figure 4.Dependence of Smoking among Current Smokers

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Table 4.Association between Various Variables and Nicotine Dependence

Age of Onset of Smoking (Years)	Degree of Dependence			Total n (%)	Chi Square/ Pvalue
	Low n (%)	Moderate n (%)	High n (%)		
11-13	01 (20)	01 (20)	03 (60)	05 (100)	$X^2 = 61.5$, Df = 8, P < 0.001
14-16	04 (17.39)	09 (39.13)	10 (43.47)	23 (100)	
17-19	33 (63.46)	19 (36.53)	00 (0)	52 (100)	
20-22	17 (41.46)	24 (58.53)	00 (0)	41 (100)	
23-25	05 (83.33)	01 (16.66)	00 (0)	06 (100)	
Total	60 (47.24)	54 (42.51)	13 (10.23)	127 (100)	
Age group of current smoker (years)					
18-20	30 (62.50)	18 (37.5)	0 (0)	48 (100)	$X^2 = 40.4$, Df = 6, P < 0.001
21-23	19 (73.07)	06 (23.07)	01 (3.84)	26 (100)	
24-26	06 (20)	20 (66.66)	04 (13.33)	30 (100)	
27-30	05 (21.73)	10 (43.47)	08 (34.78)	23 (100)	
Total	60 (47.2)	54 (42.51)	13 (10.23)	127 (100)	
Socioeconomic status					
Upper class	10 (33.33)	13 (43.3)	07 (23.33)	30 (100)	$X^2 = 23.5$, Df = 8, P = 0.003
Upper middle	16 (64)	06 (24)	03 (12)	25 (100)	
Middle	30 (58.82)	19 (37.25)	02 (3.92)	51 (100)	
Lower middle	03 (17.64)	13 (76.47)	01 (5.88)	17 (100)	
Lower	01 (25)	03 (75)	00 (0)	04 (100)	
Total	60 (47.2)	54 (42.51)	13 (10.23)	127 (100)	
No. of years of smoking					
1-5	39 (50)	38 (48.71)	1 (1.28)	78 (100)	$X^2 = 16.8$, Df=4, P=0.002
6-10	20 (48.78)	14 (34.14)	7 (17.07)	41 (100)	
10-15	1 (12.5)	2 (25)	5 (62.5)	8 (100)	
Total	60 (47.24)	54 (42.51)	13 (10.23)	127 (100)	

and 34.54% suffered from tiredness. 29.09% suffered from headache. Percentage of other problems like anger, irritability, tension, and sleep disturbances were 20%, 10.9%, 9.09% and 5.45% respectively. 27.27% suffered from more than one problem after quitting.

Nicotine dependence due to smoking among current smokers according to Fagerstrom nicotine dependence scale can be seen in Figure 4.

It was observed that 47.24% had low nicotine dependence and 42.51% had moderate dependence on nicotine. Only 10.23% were highly nicotine dependent.

Table 4 shows that the age of onset of smoking was significantly associated with the degree of nicotine dependence with younger age having more dependence. The current age of smokers was also significantly associated with dependence on nicotine, which increased with age ($p < 0.001$). High level of nicotine dependence was most prominent in the upper class and this relationship of socioeconomic status and degree of dependence was statistically significant ($p = 0.003$). It was also observed that with increasing number of years of smoking, the nicotine dependency increased. 62.5% of people who were smoking for 10-15 years had a high degree of nicotine dependence. This association between the number of years of smoking and nicotine dependence was found to be significant ($p = 0.002$).

Discussion

Nicotine dependence was an important objective of our study. In our study we found the mean nicotine dependence score to be 3.35 (SD = 2.31). In a study done by Vink et al. the mean Fagerstrome score was found to be 3.02.[8] This is

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in concordance with our study. It was also seen from our results that nearly half (47.24%) of the current smokers had low nicotine dependence according to the Fagerstrom Nicotine Dependence Scale, 42.51% were moderately dependent while only 10% were highly dependent. These results are in line with the study done by Jaya Krishnan R (51.5% low dependence, 12% moderate, and 10% were highly dependent).[14] In another study done by Shekhawat KS et al. it was found that 24.7% had low dependence followed by 48% who had moderate dependence and 27.3% who had high dependence.[15] A study conducted in Nepal showed that nicotine dependence among smokers 20.4% and 30.3% as high and moderate respectively.[16] These results are not in consensus with our study. It was also seen in this study that the mean Fagerstrome score in this study was 4.77, which is slightly more than our results. The difference might have come up because of the difference in age groups. These figures may have been because alcohol was the most common substance used in rural parts of Punjab as found by Sharma et al.[17]

Studies done on the relationship between the age of starting regular smoking and dependence on nicotine have shown that the age of initiation is an important factor in predicting the dependence on nicotine. A study done by Vink et al. showed that early age of initiation results in dependence on nicotine.[8] These results are in consensus with our study which showed a highly significant association between nicotine dependence and age of initiation ($p < 0.001$). A previous study done by Islam et al. showed that age of initiation with nicotine dependence was statistically significant, this again is in consensus with our study.[18]

Younger persons have been the worst sufferers of substance abuse in Punjab. The early initiation of smoking is because younger people are more prone to peer pressure and get easily influenced. The age of initiation of smoking is important because the earlier people start smoking, the more likely they are to continue this habit and become addicts, which will place a high disease burden on society.

In our study, it was found that the age of the current smokers and nicotine dependence had a statistically significant association ($p < 0.001$) which was not consistent with a study done by Vink et al. who did not find a statistically significant association between age and nicotine dependence.[8] The difference might be because he had included both genders in the study while in our study only male students were included.

The study also found that nicotine dependence was high in the upper class of society. This finding is in contrast with the findings by Pennanen et al. and Islam K et al. which mentioned that people belonging to low socioeconomic status and those having less education are more addicted to smoking and have high dependency.[18,19] This difference could have been because of the financial affordability of upper society people to buy tobacco products more often and at higher frequency as compared to the people belonging to the lower status.

The present study also found that nicotine dependency was significantly higher among participants who have been smoking for over 10 years. These findings were in concordance with the ones found by Islam K.[18] Thus it becomes of the most importance that youths must be warned that it may take only one cigarette to initiate a life-long dependence on tobacco. Anyone who even smokes only a few cigarettes per month may need assistance to understand and overcome craving and withdrawal. Therefore, this population of adults (18 years to 30 years) should be the focus of future cessation research.

Conclusion

Assessing the dependence on nicotine with the help of Fagerstrome nicotine dependence scale was one of the main objectives of this study. It was revealed that 47.24% were having low nicotine dependence and 42.51% had moderate dependence on nicotine. Only 10.23% were highly dependent. The age at which smoking was initiated had a statistically significant association with nicotine dependence ($p < 0.001$). Dependence of nicotine increases with age, this association of age with nicotine dependence came out to be highly significant ($p < 0.001$) in our study. Similarly, among those who had been smoking for more than 10 years, 62.5% had high nicotine dependence. Association between the number of years of smoking and degree of dependence came out to be statistically significant ($p = 0.002$).

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Conflict of Interest: None

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