

## An Epidemiological Study of Addictive Behavior Pattern Among Adolescent Tobacco Users

### Abstract

**Background:** The risk of developing tobacco-related cancer and chronic heart and lung disease is greater if addiction starts in adolescence. Even experimental use of tobacco in adolescents significantly increases the risk of addiction in adulthood. This study intends to collect valuable data regarding sociodemographic characteristic of tobacco use, pattern of dependence among adolescent tobacco users, which will be essential for formulating recommendations, and their possible intervention aimed at reducing the problem of tobacco use. **Methods:** A community-based cross-sectional study was done where 400 subjects were enrolled. Nonprobability Snowball sampling technique was used to locate adolescents aged 12–18 years, who were practicing tobacco use. Face-to-face interviews were taken for data collection. Fragerstorm dependency test for tobacco was used to classify dependency of tobacco product into high and low dependency. Data was analyzed using Chi-square test and proportions using SPSS software version 21. **Results:** Majority of the subjects were in the age group of 16–18 years; mean age for initiation of tobacco was 15.6 years. Gutkha was the predominant form of tobacco product being used. Peer pressure 192 (48.0%) was the major reason for initiation of tobacco use. A significant association was found between dependency on tobacco and age, literacy, and socioeconomic status. **Conclusions:** Tobacco use starting from early age has many health implications. There is a need for stringent laws against the selling of tobacco to adolescents and targeted health awareness program against tobacco.

**Keywords:** Adolescent, dependency, tobacco

### Introduction

Tobacco use often begins before adulthood. The global youth tobacco survey records that majority of school-going children between the age group of 13 to 15 years are currently using or have tried tobacco.<sup>[1]</sup> This is alarming because addiction to nicotine occurs faster in young tobacco users.<sup>[2]</sup> Recent research suggests that some adolescents begin to experience loss of control over their smoking within weeks of smoking the first cigarette.<sup>[3]</sup>

The risk of developing tobacco-related cancer and chronic heart and lung disease is greater in adolescents.<sup>[4]</sup> The damaging and harmful effect of tobacco usage on oral health is now well recognized. These include in particular a higher prevalence and severity of periodontal disease and malignancy among smokers.<sup>[5]</sup> Even experimental use of tobacco in adolescents significantly increases the risk of adults addicting to tobacco as well as the risk of disease and death.<sup>[6]</sup>

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Annually, over 3, 00,000 new cases of oral cancer are diagnosed all over the world where the majority are diagnosed in the advanced stages III or IV.<sup>[7]</sup> Such data make oral cancer an important public health matter which is responsible for 3% to 10% of cancer mortality worldwide.<sup>[8]</sup> In the global scenario, there is a wide variation in the incidence and mortality rates of oral cancer in different regions around the world. The highest rates are reported in South Asian countries such as India and Sri Lanka. The Indian sub-continent accounts for one-third of the world burden.<sup>[9]</sup> In the Indian scenario, oral cancer is the most common cancer in India; as 4 in 10 of all cancers are oral cancers.<sup>[10]</sup> Annually 130,000 people succumb to oral cancer which translates into approximately 14 deaths per hour.<sup>[11]</sup> The reason for the high prevalence of oral cancer in India is primarily because tobacco is consumed in the form of Gutkha, quid, snuff or masheri.<sup>[12]</sup> People mostly use paan and gutkha due to a lack of awareness and education. They are not aware of the harmful effects associated with the use

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of these substances, and it has been reported that these products are consumed for perceived beneficial effects, such as mouth freshening, aid in digestion, germ-killing, astringency, mood enhancement, tension relief, and oral cleaning.<sup>[12]</sup> Gutkha is sweet in taste, and children consider it to be a form of candy. Many people believe that gutkha is a mouth freshener, but its pleasant taste and sweetness aggregate microbes, causing damage to teeth. The use of paan and gutkha is difficult to control in most countries where it is widespread, and their extensive use leads to oral cancer.<sup>[13]</sup> The consumption of smokeless tobacco and areca nut is high in South Asian countries in the form of paan. In various South Asian languages, paan simply means “leaf.” Various ingredients are wrapped in the betel leaf. The common components of paan are tobacco, seeds, quenched lime, spices, and areca nut enfolded in betel quid.<sup>[13]</sup> Over three decades ago, a tobacco industry emerged in India producing gutkha, which consists of slaked lime, areca nut, chewing tobacco, spices, and catechu packed in tins or pouches.<sup>[13]</sup>

Oral submucous fibrosis (OSMF) is a persistent disorder of the oral cavity characterized by irritation and progressive fibrosis of the superficial and deep connective tissues. Oral cancer has been commonly observed in India, Pakistan, Sri Lanka, Taiwan, China, Indonesia, and Malaysia.<sup>[14]</sup> It is believed that the pathogenesis of OSMF is multifactorial, and is associated with nutritional deficiencies; the consumption of smokeless areca nuts, chilies, and lime; genetic abnormalities; betel quid; tobacco smoking; herpes simplex virus; human papilloma virus (HPV); chronic candidiasis; and immunological depression.<sup>[14]</sup> Oral cancer is the sixth most predominant type of cancer worldwide, affecting both genders equally, although it is particularly common in men in developing countries.<sup>[15]</sup>

According to the National Report of Global Adult Tobacco Survey conducted in India and Bangladesh, the current prevalence of smokeless tobacco use is 25.9 and 27.2%, respectively.<sup>[16]</sup> There are 30 different types of smokeless products available in these countries, including zarda, which contains dried and boiled tobacco leaves, limes, areca nut, additives, spices, and tannins.<sup>[16]</sup> Oral cancer accounts for 30% to 40% of cancer cases reported in India, and the most obvious cause is the extensive use of tobacco products, consumed via smoking and/or smokeless chewing products.<sup>[17]</sup> In addition, oral cancer occurrence is especially high in Uttar Pradesh in north India due to the extraordinary rate of consumption of smokeless tobacco products, such as paan and gutkha.<sup>[18]</sup>

In India, the prevalence of oral cancer is high. It has been previously documented that besides other factors, the extensive use of paan, gutkha, and zarda could also contribute to the development of oral cancer.<sup>[19]</sup> In India, mostly children and teenagers chew gutkha occasionally or regularly. In Mumbai, 40% of school students and 70% of

college students have been reported to regularly consume gutkha. Although some states of India have banned gutkha consumption due to its carcinogenic properties and other hazardous effects, it is still actively sold on the black market.<sup>[19]</sup> In addition, the widespread habit of paan and gutkha use is not limited to the Indian subcontinent, but extends to immigrants living in US and Europe.<sup>[20]</sup> In the Indian city of Wardha, gutkha was found to be used by approximately 46.4% of men and 20% of women.<sup>[18]</sup>

There are many studies evaluating tobacco addiction in adults but very few among children. Very few studies have tried to find out nicotine dependence among adolescent population. This study has been designed to identify and analyze the factors leading to the initiation and continuation of tobacco use among the adolescent population. Also, the study is proposed to put light on the dependency among tobacco users. The number of adolescents continuing to smoke remains a major public health problem in India and the world. There is a need to do all that we can to stem the tide of onset during adolescence and develop effective treatment programs for those young adults who are habituated to tobacco. This study intends to collect valuable data regarding sociodemographic correlation of tobacco use, pattern of dependence in the study area, which will be essential for formulating recommendations, and their possible intervention in the study area aimed at reducing the problem of tobacco use. It is incumbent upon us, the public health personnel, to use our collective efforts to bring some regulation and standardization of procedure in the field, being guided by evidence.

## Methods

A community-based cross-sectional study was conducted in urban slum, a field practice area of tertiary care hospital catering health needs of approximately 1,13,000 population. The study was conducted over a period of two years from February 2016 to December 2018. Inclusion criterion for the study was children from the age group of 12 years to 18 years practicing tobacco use. WHO defines adolescent as population aged 11 years to 19 years; however, preliminary observation indicated that number of subjects less than 12 years showed negligible use of tobacco. In India above 18 year of age is considered as adult can take his own decision. Subjects having age above 18 years and below 12 years were excluded. Assent was taken from parents or legal guardian of subjects after properly informing about the reason for study.

Sample size was estimated using formula  $Sample\ size = 4pq/e^2$  Where  $p =$  Prevalence (50%). Nonprobability Snowball sampling technique was used to locate adolescents who are practicing tobacco use. Face-to-face interviews using pretested questionnaire was used for data collection. Fragerstorm dependency test for tobacco was used to classify dependency of tobacco product into high and low dependency.<sup>[21]</sup> Subjects were divided into two

groups according to use of tobacco products as smokeless users and tobacco smokers. Dependency on tobacco product was determined using Fragerstorm dependency test. Data was analyzed with the help of Chi-square test and tests of proportions using SPSS software version 21. Ethical clearance was taken from institutional ethics committee.

## Results

The total number of respondents in the study was 400. The majority of the subjects were in the age group of 16–18 years, followed by 14–16 years and 12–14 years. The minimum age of the study participant was 12 years and oldest was 18 years. Males were the predominant tobacco user consisting 76% of study subjects while females accounted for 24% [Figure 1].

47.2% of the subjects initiated tobacco use in the age group of 16 to 18 years and the mean age for initiation of tobacco was 15.6 years. Around 14.6% of the subjects initiated tobacco use below 14 years [Figure 2].

The majority of subjects were illiterate 128 (32%). The number of subjects who attended high school was 112 (28%). 20% of the subjects attended Primary school and Jr. College. The maximum number of subjects belonged to nuclear families, 272 (68%). The majority of participants belonged to socio-economic class II (24%) and class I (19.1%) followed by other classes, class III (14.8%), class IV (16.17%), and class V (17.5%) according to B. G. Prasad scale.

The occasional user constitutes 287 (71.8%), which was higher than frequent user 113 (28.3%). There were no past users found in the present study. The percentage of smokeless type use was much higher 208 (52%) than smoking 144 (36%). Percentage of mixed form was 48 (12%).

Gutkha was the predominant form of tobacco product being used. Around 56% of the subjects used Gutkha, followed by Bidi (40%). Other smokeless tobacco forms were Masheri (23%), Khaini (24%), and pan with tobacco (23%). Cigarette use was found to be 12% [Figure 3].

Peer pressure 192 (48.0%) was the major reason for initiation of tobacco use followed by parent/sibling use 101 (25.3%) and curiosity 59 (14.8), and 48 (12%) of the subjects did not know the reason [Figure 4].

Age group of 16 years to 18 years depicts that 39% of subjects were dependent on smoking while 21.5% were dependent on smokeless tobacco. In the age group of 14 years to 16 years, 31.3% subjects were dependent on smokeless tobacco while 2.6% were dependent on smoking. Association between dependency and age group was significant for smoking (chi-square = 14.946,  $P$  value = <0.001) and smokeless tobacco use (Chi-square = 108.623,  $P$  value < 0.001) [Table 1].

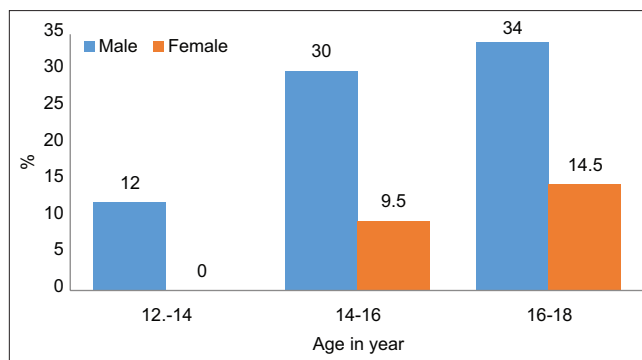


Figure 1: Age and sex distribution of subjects practicing tobacco use

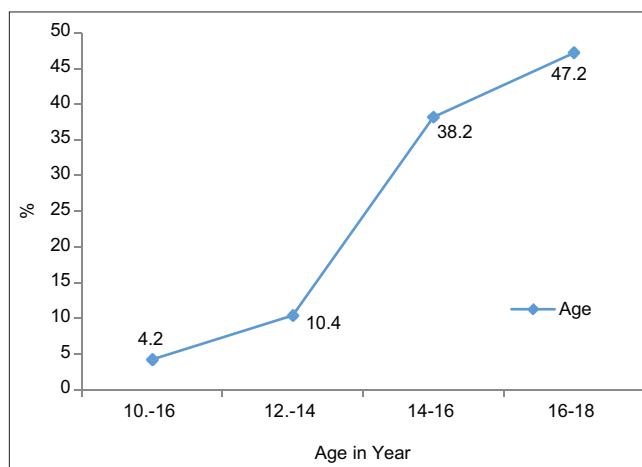


Figure 2: Age of initiation of tobacco use among adolescent tobacco users

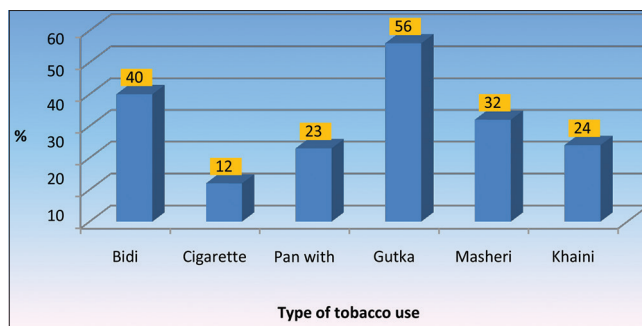
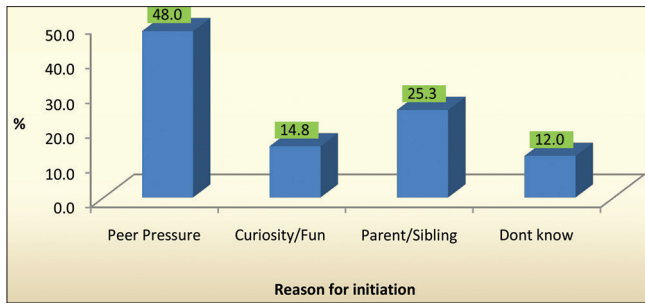


Figure 3: Distribution of subjects according to type of tobacco use

Dependency for smoking in males was 33.3% and 20% in females. While dependency for smokeless tobacco was higher in females 25% as compared to males 20%, there was no significant association between dependency on smoking and sex (Chi-square = 1.097,  $P$  value = >0.05); however, there was a significant association between sex and dependency on smokeless tobacco use (Chi-square = 128.719,  $P$  value = <0.001) [Table 1].

14.6% illiterate people were dependent on smoking while 17.6% were dependent on smokeless tobacco. Subjects having education up to Jr. college level had 18.8% dependency on smoking and 10.2% dependency on smokeless tobacco. There was a significant relationship



**Figure 4:** Distribution of subjects according to reason of initiation of tobacco use

between education and tobacco dependency either it is smoking (Chi square = 51.303 Df = 3 *P* value = <0.001) or smokeless tobacco (Chi-square = 99.016 Df = 3 *P* value = < 0.001) [Table 1].

Subjects belonging to class V have the highest dependency for both smoking (16.1%) and smokeless tobacco use (9.4%). It is followed by class IV with 12.5% dependency on smoking and 7.4% dependency on smokeless tobacco use. There was a significant relationship between the socio-economic class of subjects and dependency for both smoker and smokeless tobacco use (*P*-value < 0.001) [Table 1].

### Discussion

This study aims at determining the risk factors associated with the initiation of tobacco use at an early age and also to determine nicotine dependence among adolescent tobacco users as it can have a long-term effect on the health of individuals and can be considered as a precursor for tobacco associated neoplasms.

The age of the study participants age ranged from 12 years to 18 years, the mean age being 16 years. Most of the participants were from the age group of 14 to 18 years. Despite the fact that tobacco selling is banned for under age children, the percentage of adolescents using tobacco was very high. This depicts that proper law enforcement for the prevention of tobacco selling to minor is not observed.

The age groups reported for tobacco use initiation by other studies are diverse. In National Family Health Survey (NFHS-3), the age group for initiation of tobacco use ranged from 15 years to 49 years,<sup>[22]</sup> whereas in National Sample Survey Office (NSSO) 50<sup>th</sup> round, it was 10 years and above and in NSSO 52<sup>th</sup> round, it was 15 years and above.<sup>[23]</sup> The present study addresses the issue arising out of surrogate respondent by collecting data from each participant separately ensuring confidentiality, which may help us to rely on the findings of the study.

Tobacco dependency significantly increased with increase in age, consistently (*P* = <0.0001) for both smoking and smokeless tobacco use. Li *et al.* also found a significant association between dependency and age group in

**Table 1: Dependency of tobacco among subjects**

	High Dependency					
	<i>n</i>	Smoker	<i>P</i>	<i>n</i>	Smokeless	<i>P</i>
Age						
12-14 years	0	0	0.001	0	0	0.001
14-16 years	37	5 (2.6)		139	25 (9.8)	
16-18 years	155	75 (39.1)		69	55 (21.5)	
Gender						
Male	160	64 (33.3)	0.329	176	16 (6.3)	0.001
Female	32	16 (8.3)		80	64 (25)	
Literacy						
Illiterate	40	28 (14.6)	0.001	61	45 (17.6)	0.001
Primary	0	0 (0)		80	0 (0)	
High School	97	16 (8.3)		57	9 (11.3)	
Jr. College	55	36 (18.8%)		58	26 (10.2)	
Socioeconomic status						
V	48	31 (16.1)	0.001	53	24 (9.4)	0.001
IV	57	24 (12.5)		57	19 (7.4)	
III	42	25 (13)		53	22 (8.6)	
II	29	0 (0)		44	10 (3.9)	
I	16	0 (0)		49	5 (2.0)	

their study titled “The Relationship between Nicotine Dependence and Age among Current Smokers.”<sup>[24]</sup>

Illiteracy among adolescents was high. 32% of the current users were illiterate. 28% were studied up to high school and 20% studied up to primary and Jr. college, respectively. Illiterate subjects were in significant numbers, probably because most subjects migrated and came to urban area for earning money. In the process, they missed the opportunity of education.

Tobacco use was found to be inversely related to the level of education as seen in Figure 4. Subjects with lower levels of education were nearly two times more than persons with higher literacy level. These findings were similar to studies like WHO Tobacco or Health: A global report, Geneva WHO<sup>[25]</sup> and Sorensen *et al.*’s study titled “Social Disparities in Tobacco use in Mumbai, India.”<sup>[26]</sup> According to NSSO 50<sup>th</sup> round, the inverse trends seen for smoking and chewing by educational level were highly significant for men and women. Individuals with less educational level were 2.2 times more likely to smoke and chew tobacco than those with postgraduate education. There was a significant relationship between literacy level and dependency on both smoking and smokeless tobacco use (*P*-value < 0.001). A similar finding was observed in a study by Manimunda *et al.*<sup>[27]</sup> titled “Tobacco and nicotine dependence in a cross-sectional representative sample of 18,018 individuals in Andaman and Nicobar Island, India.”

Most of the tobacco users were from lower socioeconomic class. The majority of subjects belonged to class II (24%), Class I (19.1%), and class V (17.5%) compared to other classes of B. G. Prasad socioeconomic scale. There was an inverse relationship between dependency and

socioeconomic scale; the lower the socioeconomic scale, the greater is the dependency. The socioeconomic scale was a significant determinant of dependency on tobacco use for both Smoking and smokeless tobacco ( $P$  value < 0.001). A similar finding is shared by Subramaniam *et al.*'s study titled "Patterns and distribution of tobacco consumption in India."<sup>[28]</sup> The relationship between socioeconomic markers and tobacco consumption is also similar to that observed in developed countries as studied by Giovino *et al.*<sup>[29]</sup> in "Epidemiology of tobacco use and dependence."

Among adolescent tobacco users, the practice of smokeless tobacco was found to be more prevalent than smoking. 52% of the subjects were using smokeless form of tobacco and 36% of the subjects were smokers. 12% of the subjects showed a mixed type of tobacco use. Smokeless tobacco use is on the rise because of low cost and ease of access to adolescents.

Gutkha use was at clear majority among tobacco products being used, contributing 56% of total tobacco use. Bidi was second favorite with 40% subjects using it. Masher and Khaini use was at 32% and 24%, respectively. The prevalence of pan with tobacco was 23% and cigarette use was 12%. Overall smokeless tobacco use was more prevalent than smoking. The cause is due to ease of availability and cheaper price. Cigarette smoking was low due to higher cost. A similar finding was observed by Sinha *et al.*<sup>[30]</sup> in their study titled "Tobacco use among students in the eight North-eastern states of India."

Early initiation of tobacco use was seen among subjects. 47.2% of the subjects initiated tobacco use in the age group of 16 to 18 years. Around 14.6% of the subjects initiated tobacco use below 15 years of age. This shows that significant numbers of adolescents are prone to tobacco addiction at very early age of life. According to the Global Adult Tobacco Survey 2010,<sup>[1]</sup> the average age of initiation of tobacco use was 17.8 years. According to Integrated Disease Surveillance Project report (IDSP 2008),<sup>[31]</sup> the age of initiation of smoking as well as smokeless tobacco use was 20 years. Thus, our study is reporting a much lower age of initiation of tobacco use. A significant association was found between the early age of initiation and dependency on tobacco products for both smokeless tobacco use and tobacco smoking ( $P$ -value < 0.05).

Out of various reasons for initiation of tobacco use, 48% of the subjects started tobacco use because of peer pressure; 25.3% of the subjects responded that they tried tobacco use because their parents or siblings are practicing it; 14.8% started tobacco use for their curiosity or fun; and 12% subjects did not know the reason. The above reasons were the provocative factors for triggering tobacco use and these could be the places of intervention for tobacco use onset. This finding was similar to Mujumdar *et al.*'s<sup>[32]</sup> study titled "Sociodemographic factors associated with tobacco use in Maharashtra."

## Conclusions

Much lower age of initiation of tobacco was reported in our study that underlines the strict implementation of tobacco prevention laws in the community. Tobacco use was seen prevalent in lower socioeconomic groups and illiterate persons, thus suggesting that high percentage of children dropouts from school have to be tracked down and brought back to mainstream schooling so that they can be protected from adverse effects of tobacco addiction. Most of the driving forces for tobacco initiation were peer pressure, sibling or parental use, and curiosity about the product. That means there is not enough awareness about the hazards of tobacco products. Therefore, this study suggests that separate chapters should be included in the curriculum of children depicting various health hazards of tobacco products and also rigorous steps should be taken to decrease school dropouts.

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## Conflicts of interest

There are no conflicts of interest.

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