**Prevalence and factors leading to initiation of tobacco smoking among the University students in Bangladesh**

**Running Title: Factors associated with tobacco use among the University students**

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**Abstract**

**Background:** Tobacco smoking is considered as the chief risk factor for causes of preventable morbidity and mortality globally, and is responsible for causes of many untimely deaths. This study was aimed to determine prevalence and factors associated with current tobacco smoking among the university students in Bangladesh.

**Methods:** A cross-sectional study was conducted on 264 students of Jahangirnagar University, Dhaka, Bangladesh in 2015. A standard self-administered questionnaire consisting of socio-demographic data, participant tobacco smoking status, family and peer tobacco smoking history, attitudes and beliefs about tobacco smoking, knowledge of tobacco smoking and its negative effects was used in this study. Data were entered and analyzed using software of Statistical Package for Social Sciences (SPSS) version 20.0.

**Results:** The prevalence of tobacco smoking was 60.2% where male is significantly higher than female. Among male and female students tobacco smokers were 68.81% and 19.56% respectively, where among tobacco smoking 94.34% male and 5.66% female. The two main significant reasons cited for starting tobacco smoking were curiousness (86.16%) and peer pressure (62.26%). Continuing factors were depression (OR: 0.939; p-value: 0.05), Dispute relationship with girlfriend (OR: 1.135; p-value: 0.005) and fancy (OR: 0.864; p-value: 0.001). Logistic regression model identified that smoking-related attitudes, facing health problems, died family members from CHD and Cancer are significantly associated with tobacco smoking.

**Conclusion:** The current tobacco smoking prevalence among the university students in Bangladesh is very much high. So, this study provides more detailed consideration of the implications for the WHO Framework Convention on Tobacco Control (FCTC) policies, especially for the university students.

**Key words:** University students; Tobacco smoking; Health; Bangladesh

**Introduction:**

Tobacco smoking has long been associated with several health problems and is considered a chief preventable risk factor for six of the eight leading causes of morbidity and mortality globally.1The habit of tobacco smoking has spread throughout the world and, as a major source of morbidity and mortality, is a serious public health problem.2-7Tobacco smoking is the leading cause of preventable death, and is estimated to kill nearly 6 million people each year worldwide; most of these deaths are in low- and middle-income countries. Future projections suggest that tobacco will kill more than 8 million people worldwide each year by the year 2030, with 80% of these premature deaths occurring in low- and middle-income countries.8Recent information have shown that there are about 1.3 billion smokers in the world, 80% of whom are in developing countries.9Tobacco smoking have many detrimental impacts on general health and it well known tobacco smokers die 10 years earlier than non-smokers.10,11Tobacco smoking reasons lung cancer, chronic obstructive lung disease, atherosclerotic cardiovascular diseases, peptic ulcer disease, intrauterine growth retardation, spontaneous abortion, antepartum hemorrhage, female infertility, sexual dysfunction in men, and many other diseases.12Globally, it has become a fast growing problem of public health concern as it has been calculated that nearly a third of the world’s population, aged 15 years above, are smokers and prevalence is on the rise, especially in developing countries.13,14 There are increasing numbers of youths starting to smoke at an earlier age which is a major concern to public health.15 University students constitute a high risk group regarding the adoption of risky behavior, such as smoking and illicit substance use.16,17University students are at high risk of smoking as they become exposed to greater availability of cigarettes and close association with smoking peers. At the same time, they face additional social, emotional and educational challenges when they enter the university.18-21University students are prone to risk taking behavior, which has been associated with the underdevelopment of the orbital-frontal cortex.22Moreover, during this stage, identity development is a major concern and youth are susceptible to peer pressure.20Cigarette smoking is of major public health concern among youths in both industrialized and developing countries. The Global Youth Tobacco Survey (GYTS), conducted in 131 countries and which surveyed 750 000 college students, showed that smoking starts as early as at 13–15 years of age. This survey found that approximately 9% of students were current cigarette smokers, while 11% currently used tobacco products other than cigarettes.23A study conducted among college students in northwest Ethiopia revealed 13.1% lifetime prevalence rate of cigarette smoking and 8.1% current prevalence of cigarette smoking.24Another survey among undergraduate medical students at Addis Ababa University reported a lifetime smoking prevalence of 9% and the current smoking prevalence of 1.8%.25A survey conducted among university students in southwest Nigeria showed that the prevalence of ever smoked was 22.0%, while those that currently smoke were 13.7%.26Similarly, a study conducted among university students in Cameroon reported an ever smoking prevalence of 30.1% and the current smoking prevalence of 6.3%.27 A study found that generally 34% of men and 27% of women were current smokers, including 4 middle income countries – Columbia 37% in men and 28% in women, South Africa 15% and 4%; Thailand 14% and 2%, and Venezuela 22% in men and 22% in women.28 Among other university student populations in low and middle income countries, present tobacco smoking was 9% in Egypt29,33% in India30, 19.8% of male and 2.2% of female students in Iran31, 14.7% in Malaysia32, 5.7% (males 7.7%, females 2.0%) in Nigeria33, among male 24% in Pakistan34 and 45.9% in Turkey35. Another study among the youth in India about 80% of students believed that tobacco use is harmful to their health.36

In Bangladesh, the tobacco smokers are increasing rapidly because of easy availability of cheap tobacco products, lack of strong tobacco control regulations and weak enforcement of regulations. The Global Adult Tobacco Survey of WHO reported that Bangladesh is one of the top ten countries in the world with high tobacco use (both smoking and smokeless form) prevalence of 43.3% adults (41.3 million) where44.7% men are involved in smoking.37 A study based on countries demographic and health survey data reported that the prevalence of tobacco smoking among men in Bangladesh is 60%.38 Another study among the male university students in 2009 stated that 36.1% students were involved in tobacco smoke.39Among fourth-year dental students, the prevalence of cigarette smoking was reported to be 49.5% and 1.7% in male and female respectively.40

An increasing trend of tobacco smoking is anticipated to occur among university students and this could be related to alleviation of stress, life problems, peer pressure, social acceptance, class history of smoking, lower educational level of parents and the desire to attain high personality profile.41Situation of Bangladesh is not well mannered and there is enough lacking knowledge about the tobacco smoking among the University students. Most of the cases, exposure level begins after being admitted in the University. In this regards the aim of this study was to estimate the prevalence of tobacco smoking among University students and to identify factors that may be related to tobacco smoking.

**Methodology:**

**Design and Study participants**

A cross-sectional study was undertaken in Jahangirnagar University which is about 30 km far from the downtown area of Dhaka, Bangladesh (Figure-1). Approximately 14500 students are studying in this university in both undergraduate and postgraduate level in different faculties. The inclusion criteria for the study sample were full-time student status, enrolment in one of the university’s undergraduate and postgraduate programs and age between 17 and 24 years.

**Sampling and Data collection:**

A simple random sample of 264 students from first year to final year of all faculties was included in the study. A well- constructed questionnaire (5sections) to be completed by them was distributed to participants. The questionnaire was tested in a pilot study of 50 students. Minor phrasing modifications were made on the original questionnaire after the pretest. The self-administered questionnaire covered demographic data (age, sex, class, and family background, including paternal and maternal education levels, employment, and income levels), tobacco smoking patterns (type of smoking, frequency, age of initiation, and duration), and possible risk factors for tobacco smoking, smoking status (current and non-smoking), average number of cigarettes/bidis smoked daily and socio-demographic status of living away or with the family. In order to maximize the response rate, the questionnaires were checked daily by trained researchers and if data were missing, the questionnaire was immediately returned to the respective respondent for completion.

**Measures**

We applied the standard of GYTS for calculating the prevalence of tobacco smoking.42Our measures of tobacco smoking were derived from three questions resulting in two measures: ever smoker and current smoker. A smoker was defined as someone who was currently using ≥1 tobacco product (cigarettes, bidis, cheroots etc.). Current smoking included daily, nondaily, and occasional smoking in the past 30 days preceding the survey. Ever smoker refers to a person who smoked at least 1 tobacco product (cigarettes, bidis, cheroots, etc.) at any time.

**Ethical clearance:**

This study was conducted in accordance with the ethical standards and all of the participants involved in this study have read, understood, and signed a written consent form. This study was approved by the Bio-safety, Bio-security & Ethical Committee of Jahangirnagar University and during distribution of the questionnaire, students were informed that the information collected would be kept anonymous and participation was totally voluntary.

**Data Analysis:**

Data analysis involved descriptive statistics as well as inferential statistics. Descriptive statistics included simple tabulation, frequencies, and proportions for categorical variables including cross tabulations. Quantitative variables were expressed as means with SDs, and qualitative or categorical ones as frequencies and percentages. Differences between proportions were assessed for significance using the chi-square test. Variables that were found to be significantly associated with tobacco smoking were further analyzed using logistic regression models. Univariate and multivariate analyses were conducted among the variables. During multivariate regression analysis, we adjusted for various factors including: age, sex, smoking status, second hand exposure to smoking, knowledge, attitude and practices among the tobacco smokers and the diseases fatality among the family members, associated with tobacco smoking. Adjusted odds ratios (ORs) and 95% confidence intervals were reported. The level of significance was *P<*0.05. Data were entered into Microsoft Excel firstly and then transferred to SPSS software for windows, version 20.0 (Chicago, IL, USA) for analysis.

**Results and Discussion:**

**Demographic characteristics of study population**

A total of 346 students both from male and female were initially distributed questionnaire to participate in the study. Of them, completed questionnaire were acquired from 264 students where 46 (17.4%) were female and 218 (82.6%) were male which is also statistically significant (P < 0.001). Only 82 individuals both from male and female did not show interest to fill the questionnaire, or refused to participate in the survey. Therefore the response rate was (76.30%). Respondents ranged in age from 18-27 years, with a mean of 21.55 (± 1.98) years. The majority (76.1%) of the respondents were of the age group 20-23 years. Study suggested that age was an important factor related to tobacco smoking among university students with older students more likely to be smokers.43 The differences between the age of smokers and non-smokers were statistically significant (P = 0.042) which was also observed in a study in China.44Among tobacco smokers male students in our study were found to be 94.34 %, which was significantly higher than tobacco smoking by females (5.66 %). This finding is reliable with the literature at the KSA level and for Muslim countries where culture and norms play an important role in female behaviors and customs.45,20,46 Our estimate of tobacco smoking prevalence among females is low compared with the estimate from other studies.47,48,49About three sevenths (43%) of the respondents were from first year and 26%, 11%, and 4% were from 2nd year, 3rd year and 4th year respectively. The remaining 16% respondents were from masters students. Though all the respondents did not mention their department, most of them those who mentioned their department were under the faculty of Biological Sciences (33%), remaining were faculty of Arts and Humanities (31%), faculty of Mathematical & Physical Sciences (17%), faculty of Social Sciences (13%) and faculty of Business Studies students (6%) (Table-1). Out of 264 respondents 206 (78%) mentioned their department.

**Initiation of tobacco smoking**

According to the World Health Organization, most of the students start their first use of tobacco smoking before the graduation, beginning from high school years.37In our study, most of the students started their first tobacco smoking in the adolescent age. The average age of initiating tobacco smoking was 17.91 years with standard deviation ±2.1. Initiation of tobacco smoking was longer by a few years among girls (20.25 years with standard deviation ±1.71) than boys (17 years with standard deviation ±3.32). Some students reported initiation of tobacco smoking as early as 12 years of age and nearly one third (30%) of ever smokers initiated it before they were 17 years of age. Initiation of tobacco smoking was found to be dramatically increased after seventy years of age until 21years and then decreased (Figure-2).The finding of our study is similar to that of the study reported by World Health Organization.

Most of the cases respondents were initiated tobacco smoking by the influence of friends and by the imitation of family members. Main variables of starting tobacco smoking are forced, curiousness, friend influence, class mate influence and acquainted persons influence, which all are statistically significant (p=0.05).Some respondents claimed that they were constrained for initiating tobacco smoking. Study showed that staring of tobacco smoking was forced by friends (10.70%), classmates (7.18%) and acquainted persons (27.67%) respectively (Table-2). Most prevalence factor was friends influence (62.26%) so that they were starting it and could not give up. As reported by many authors smoking among friends and their influence was found to be a significant determinant of smoking, indicating a link between peer pressure and the development of smoking habits.21,50-52 Family association also has an influence on tobacco smoking; the smoking habits of family members had a statistically significant effect (OR:12.86; p-value:0.05) on the smoking habits of their offspring or siblings. This analysis is consistent with findings of previous studies.20,21The respondents were asked if any of their family members (parents, siblings, uncle and other members residing permanently) used tobacco products. A considerable proportion (69.62%) of students reported that at least one family member has the practice of tobacco smoking which was also statistically significant (Table-2). From the analysis of the data it was seen that almost 64.30 % of the head (father) of the family of all respondents was involved in tobacco smoking, 51.80 % brothers of the respondents among the smokers were tobacco smokers.

Among tobacco smokers, almost 62% were trying to give up tobacco smoking at any stage after initiating tobacco smoking. But they did not fully triumph to quit tobacco smoking. Students were asked which things are influencing them to continue tobacco smoking. Only less than 2 percent did not agree to answer this multivariate question. Majority of the respondents (54.18%) mentioned that due to the mental depression, they were continuing tobacco smoking (Table-2). The next large proportion (42.30 percent) said that dispute relationship with girlfriend made them to continue tobacco smoking and sometimes extreme use of other tobacco products. After that a sizable proportion almost 37.20% percent addressed that they had started tobacco smoking just from fancy and since then they were continuing. Still now they did not find any constructive region behind tobacco smoking. And about 14% told that due to educational problem, they are continuing tobacco smoking. Unstable relationship among family members due to quarrel or other inconsistencies had also a factor for continuing tobacco smoking.

**Knowledge and perception about hazards of tobacco smoking**

The knowledge and perception of the respondents were measured with both single and multi-response answer questions. Students were asked if they were aware of the harmful effects of tobacco smoking. Of the total respondents, 253 (95.83%) students claimed to have knowledge about the hazards of tobacco smoking (Table-3). Among the students who reported to have knowledge about the health hazards of tobacco smoking, 218 (86.16%) have ever used tobacco product mainly cigarette and 35 (13.83%) were never used. Almost 64.2 percent students were corroborated with the statement of students should not smoke, but 21.6 percent students from smokers did not agree with this statement. Among them 81.30 percent reported that use of tobacco especially cigarette smoking makes them fresh that brings mental tranquility.

Majority of the students who participated in this study (95.83%) were knowledgeable on the relationship between smoking cigarettes as cause of systemic diseases. This is encouraging because knowledge of detrimental effects of tobacco smoking has been shown to be a deterrent for tobacco smoke. Therefore, this higher level of knowledge on adverse effects of cigarettes smoking on systemic diseases would have been enough for low prevalence of tobacco smoking. But in the current study it was not. Moreover the prevalence rate was almost double in the context of Bangladesh. The findings of the present study are similar to that reported in the United States, Great Britain and Australia among adults where the proportion of respondents knowledgeable on cigarettes smoking as cause of heart diseases and lung cancer were (85.8%, 94.4%); (92.3%, 98.2%) and (94%, 91%) respectively.53-55 However the proportion of adolescents in Denmark who were knowledgeable on lung and heart diseases was lower 46.3% and 49.3%, respectively.56Besides, students were reported their current health problems because of tobacco smoking. Among smokers almost 46 percent reported that they were suffering from diseases because of tobacco smoking. Coughing was the common among them. Almost 63 percent reported that they were having cough. Other health problems were 46.70 percent had breathing problem, 9.30 percent had asthma, 37.30 percent had chest pain, 41.30 percent had lack of appetite and 5.30 percent had others problem beside those respectively (Figure-3).

**Consumption rate and economic loss of tobacco smoking**

Among the tobacco smokers, 37.7% smoked 1 to 5 sticks, 47.8% smoked 6 to 10 sticks and 14.5% smoked more than 10 sticks per day. On an average, 6.94 ± 3.1 sticks were consumed by them. It was estimated from the analysis that 159 tobacco smoker’s yearly expenditure is 2.7×106 BD taka (2.7 million) only for tobacco smoking. On an average, 37.1% tobacco smokers are spending more than 50 taka per day for smoking. Thirty four percent of the smokers are expending 30-50 taka per day and the remaining 29% spend up to 30 taka in a day.

**Logistic regression analyses:**

Table-4 shows the results of logistic regression including statistically significant variables from the both univariate and multivariate analyses. The most important independent predictors of tobacco smoking among the students were the perception– looking smart (OR = 1.642; 95% CI = 1.908 – 1.48 and p < 0.001), looking modern (OR = 5.40; 95% CI = 1.02 – 2.847 and p < 0.001) and social pressure especially peer pressure (OR = 0.992; 95% CI = 0.116 – 8.457and p < 0.05). Similar studies have also proved the significant association between these variables.57,58,51,46,52 The findings of the logistic regression analysis also demonstrated that the strongest relationship between tobacco smoke and Coronary heart diseases and Cancer (OR = 3.125; 95% CI = 0.760 – 12.843and p < 0.006). This is also a well-established association. A lot of studies have found the linkage of these diseases.59,60

**Conclusion and Recommendations**

The findings of our study reveal that tobacco smoking is tried by students during the early adolescent years and continues throughout the university years. Male smokers were significantly higher than female smokers and tobacco smoking rate was higher among males than females. Relatively less consumption of tobacco smoking among female students may be due to limited opportunities, social tradition, and social restriction. Fun and pleasure, peer pressure, psychological stresses were the main causes of the starting of tobacco smoking and also family members of the tobacco smokers have been playing a vital role indirectly to initiate tobacco. Awareness of harmful effects of tobacco smoking is the most common reason for the willingness of students to quit tobacco smoking. This emphasizes the fact that, awareness about the harmful effects of tobacco does motivate the smokers to quit. This has been proved in many developed nations, where massive public awareness campaigns have resulted in decline in tobacco smoking. These facts must be taken into account by developing countries, which should continue to focus on public awareness measures. Anti-tobacco smoking campaigns also need to be implemented to create awareness among students at the basic education level to reduce the prevalence of the habit in universities and to avoid its unfavorable health consequences. This study provides more detailed consideration of the implications for the WHO Framework Convention on Tobacco Control (FCTC) policies for students. Our findings also provide a knowledge base from which to develop targeted tobacco control policies for university students. If we can establish a holistic approach for tobacco control in university level, the overall tobacco control movement in Bangladesh will be accelerated. Besides, smoke free campus policy will enhance other universities to create a healthy environment for education in future. The Government of Bangladesh should have taken steps to eradicate the evil of tobacco smoking and the laws should be strongly enforced by the concerned agencies. We should also seriously consider introducing a separate subject on health at the school level to educate children about harmful effects of tobacco smoking. These measures along with legislative control will go a long way in creating a tobacco smoking free society.

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Table 1: Demographic characteristics of study population and proportion of students using tobacco (n=264)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Character** | **Smoker (%)** | **Non-smoker (%)** | **Frequency (%)** | **Statistical Testa** |
|  | Male | 150 (94.34)  | 68 (64.76)  | 218(82.60) | X2 = 38.45P < 0.001 |
| Sex | Female | 9 (5.66) | 37 (35.24) | 46(17.40) |
|  | Frequency | 159 (60.20) | 105 (39.80)  | 264(100) |
| Age | Age Group16 – 19 years20 – 23 years24 – 27 years  | 10 (52.60)117 (58.20)32 (72.70) | 9 (47.40)84 (51.80) 12 (27.30) | 19 (7.20)201 (76.1)44 (16.7) | X2 = 3.31P = 0.042 |
| Mean Age (±SD) of Smokers | X2 = 25.67P = 0.004 |
| Male | 17 (3.32) |
| Female | 20.25 (1.71) |
| Academic Year | 1st | 69 (61.06) | 44 (38.94) | 113 (42.80) | X2 = 6.89P= 0.142 |
| 2nd | 34 (48.57) | 36 (51.43) | 70 (26.51) |
| 3rd | 20 (71.43) | 8 (28.57) | 28 (10.61) |
| 4th | 7 (63.64) | 4 (36.36) | 11 (4.17) |
| Masters | 29 (69.04) | 13 (30.96) | 42 (15.91) |
| Facultyb | Business Studies | 7 (58.33) | 5 (41.67) | 12 (6.00) | X2= 14P= 0.007 |
| Social Sciences | 14 (53.85) | 12 (46.15) | 26 (13.00) |
| Mathematical & Physical Sciences | 21 (58.33) | 15 (41.67) | 36 (17.00) |
| Arts & Humanities | 47 (73.44) | 17 (26.56) | 64 (31.00) |
| Biological Sciences | 28 (41.17) | 40 (58.83) | 68 (33.00) |

Note. aBased off Chi-square analyses. bAll respondents did not answer their department as well as faculty, 206 (78%) answered this question.

Table- 2: Prevalence of factors for initiating tobacco use

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Prevalence,%** | **Odds Ratio** | **P-valuea** |
| **Start tobacco use by** |
| Forced | 10.70 | 0.992 | 0.050 |
| Curiousness | 86.16 |
| Friends influence | 62.26 |
| Classmates influence | 7.18 |
| Acquainted persons influence | 27.67 |
| **Family association** |
| At least one familymember usestobacco | 69.62 | 12.862 | 0.054 |
| Father’s use | 64.30 | 5.674 | < 0.001 |
| Brother’s use | 51.80 | 4.753 | < 0.001 |
| Uncle’s use | 53.60 | 4.422 | < 0.001 |
| Grandfather’s use | 21.40 | - | 0.126 |
| **Influencing factors for continuing tobacco use** |
| Mental depression | 54.18 | 0.939 | 0.050 |
| Bad family relation | 6.92 | - | - |
| Educational problem | 13.84 | - | - |
| Dispute relationship with girlfriend | 41.51 | 1.135 | 0.005 |
| Fancy | 36.48 | 0.864  | 0.001 |

Note. aBased off Multinomial logistic regression analyses.

Table-3: Proportion of students by knowledge and perception about hazardous tobacco smoking-

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Character**  | **Smoker (N, %)** | **Non-smoker (N, %)** | **± SD**  | **OR** | **P-valuea** |
|  | **Agreed** | **Disagreed** | **Agreed**  | **Disagreed** |  |
| Student should not smoke | 102 (64.2) | 57 (35.8) | 105 | - | 0.481 | 2.356 | 0.216 |
| Tobacco brings mental tranquility  | 126 (81.30) | 29 (18.70) | - | - | 0.391 | 0.937 | 0.065 |
| Use of tobacco is a cause of economic loss | 109 (77.65) | 50 (22.35) | 96(91.43) | 9 (8.57) | 1.064 | 1.368 | <0.001 |
| Having knowledge  | 218 (86.16) | 35 (13.83) | 0.244 | 7.385 | 0.062 |

Note. aBased off Logistic regression analyses.

Table-4: Multivariate logistic regression analyses for smoking-related factors among the students

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Category | Variable | OR | 95% CI | *p-*Value |
| Smoker looks | BadSmartModernGeneral | 11.6425.405.688 | -1.908 – 1.481.02 – 2.8475.688 – 5.688 | -<0.001a<0.001a<0.001a |
| Faced health complexity due to tobacco smoking | sex | 7.385 | 0.901 – 60.509 | 0.062b |
| age | 1.244 | 0.660 – 2.345 | 0.50b |
| Family members died from CHD and Cancer | smoker | 3.125 | 0.760 – 12.843 | 0.006a |
| Exposer to environmental tobacco smoke | sex | 3.190 | 0.587 – 17.331 | 0.179b |
| Student should not smoke | sex | 2.356 | 0.606 – 9.152 | 0.216b |
| Smoking by pressure | sex | 0.992 | 0.116 – 8.457 | 0.050a |

Note.aBased off Multinomial logistic regression analyses, bBased off Binary logistic regression analyses. Abbreviation: CI = confidence intervals, OR= odds ratio.



 Figure-1: Location Map of the Study Area.



Figure-2: Percent of Age of initiating tobacco smoking by gender

 Figure-3: Current health problems among the study population due to tobacco smoking