

## Knowledge, Attitudes, and Patterns of Tobacco Use among Adolescents in Mathura District, Uttar Pradesh: A Cross-Sectional Study

Pawar Akshay Shahaji<sup>1</sup>, Manoj Kumar Singh<sup>2</sup>, Saurabh Singh<sup>3</sup>, Pankaj Kumar Jain<sup>4</sup>

<sup>1</sup>Third Year Postgraduate Resident, Department of Paediatrics, Krishna Mohan Medical College and Hospital, Mathura, Uttar Pradesh, India

<sup>2</sup>Professor and Head, Department of Paediatrics, Krishna Mohan Medical College and Hospital, Mathura, Uttar Pradesh, India

<sup>3</sup>Associate Professor, Department of Paediatrics, Krishna Mohan Medical College and Hospital, Mathura, Uttar Pradesh, India

<sup>4</sup>Professor, Department of Paediatrics, Krishna Mohan Medical College and Hospital, Mathura, Uttar Pradesh, India

---

Received: 01-01-2026 / Revised: 15-02-2026 / Accepted: 21-03-2026

Corresponding author: Dr. Pawar Akshay Shahaji

Conflict of interest: Nil

---

### Abstract

**Background:** Tobacco use during adolescence is a major public health concern because initiation at a young age increases the risk of long-term nicotine dependence and adverse health outcomes. This study assessed the prevalence of tobacco use among adolescents and evaluated their knowledge and attitudes regarding tobacco use.

**Methods:** This cross-sectional descriptive study included 300 adolescents aged 13–17 years in Mathura district, Uttar Pradesh. Participants were selected using a stratified random sampling method. Data were collected using a pretested and prevalidated structured questionnaire administered in English and Hindi. Descriptive statistics were used to summarise the data, and Pearson's chi-square test was used to assess associations between categorical variables. A p value of less than 0.05 was considered statistically significant.

**Results:** Ever use of tobacco was reported by 102 of 300 participants (34.0%). Chewable tobacco and cigarettes were the most commonly reported products, each used by 29 participants (9.7%), followed by smokeless tobacco products such as gutkha, mawa, and jarda in 20 participants (6.7%). Daily tobacco use was reported by 40 participants (13.3%). Tobacco use increased significantly with age, from 16.5% among those aged 13–14 years to 48.7% among those aged 17 years. No significant association was observed between sex and ever tobacco use. Friends or family members using tobacco were reported by 60.0% of participants, 85.7% reported tobacco products to be easily or very easily available, and media influence was reported by 70.7%. Observational exposure to tobacco use was significantly associated with ever tobacco use ( $p=0.036$ ), whereas awareness of health risks and belief that tobacco is harmful were not significantly associated with tobacco use ( $p=1.00$  for both).

**Conclusion:** Tobacco use was common in this adolescent population despite substantial awareness of harm. Social exposure, easy availability, and increasing age appeared to be important correlates, indicating the need for focused preventive and cessation-oriented interventions for adolescents.

**Keywords:** Adolescents; Tobacco Use; Knowledge; Attitude; Prevalence; Cross-Sectional Study.

**DOI:** 10.25258/ijcpr.18.4.69

---

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

---

### Introduction

Tobacco use remains a major global public health problem and is a leading cause of preventable morbidity and mortality. Adolescence is a critical period for tobacco initiation, and early exposure increases the likelihood of long-term dependence and sustained adverse health outcomes. [1,2]

Psychosocial influences such as peer behaviour, family environment, social modelling, and the

perception of tobacco use as a marker of maturity contribute to tobacco initiation during this period. [3,4] In India, tobacco use continues to impose a substantial public health burden, with both smoked and smokeless forms widely available. The Indian tobacco environment is shaped by socioeconomic disparities, product accessibility, and variable enforcement of tobacco control measures, all of

which may influence initiation and continued use in adolescents. [5,6]

Although several studies have reported the prevalence of tobacco use among adolescents, fewer have examined knowledge, attitudes, and associated social and environmental factors together in a local adolescent population. This study was conducted to assess the prevalence of tobacco use among adolescents aged 13–17 years in Mathura district and to evaluate their knowledge and attitudes regarding tobacco use, along with selected socio-demographic and environmental factors associated with tobacco consumption.

### Materials and Methods

**Study design and setting:** This cross-sectional descriptive study was conducted in schools located in Mathura district, Uttar Pradesh. Both urban and rural areas were included to ensure representation of adolescents from diverse socioeconomic and cultural backgrounds. Government and private schools were included.

**Study duration:** The study was conducted from December 2023 to January 2026.

**Participants:** The study population comprised adolescents aged 13–17 years residing in Mathura district. Adolescents from different socioeconomic strata, educational backgrounds, and residential settings were included.

**Inclusion criteria:** Adolescents aged 13–17 years, residents of Mathura district, those willing to participate and provide assent, and those for whom parental or guardian consent was obtained were included.

**Exclusion criteria:** Children with intellectual disability, chronic illnesses, or syndromic conditions were excluded.

**Sample Size:** The sample size was calculated using the standard formula for estimating a proportion. Taking the prevalence of tobacco use among adolescents as 22.4%, with a 95% confidence level and an allowable margin of error of 5%, the minimum required sample size was 268 participants. The final sample size was increased to 300 to account for potential non-response and improve precision.

**Sampling Method:** A stratified random sampling method was used. Stratification was performed according to age group, sex, socioeconomic status, and geographical location. Schools were selected randomly from each stratum using probability proportional to size, and adolescents were selected from different grade levels to ensure age diversity.

**Data collection and variables:** Data were collected using a pretested and prevalidated structured questionnaire. The questionnaire included socio-demographic details, tobacco use behaviour, influencing factors such as family, peers, media, and availability, as well as knowledge and attitudes regarding tobacco use. The questionnaire was administered in English and Hindi. Data collection was carried out in confidential school settings with adequate privacy.

**Outcome Measures:** The primary outcome was ever use of tobacco. Secondary outcomes included type and frequency of tobacco use, exposure to tobacco use in the immediate environment, availability of tobacco products, attitudes toward tobacco control measures, intention to quit, and associations of tobacco use with demographic and knowledge-attitude variables.

**Statistical Analysis:** Data were entered into Microsoft Excel and analysed using IBM SPSS Statistics for Windows, version 27.0. Descriptive statistics were used to summarise participant characteristics and tobacco use patterns. Continuous variables were summarised as mean  $\pm$  standard deviation, and categorical variables were presented as frequencies and percentages. Pearson's chi-square test was used to assess associations between categorical variables. A *p* value of less than 0.05 was considered statistically significant.

**Ethical Considerations:** Institutional Ethics Committee approval was obtained before initiation of the study. Written informed consent from parents or guardians and informed assent from participants were obtained. Confidentiality and anonymity were maintained, and no personal identifiers were used.

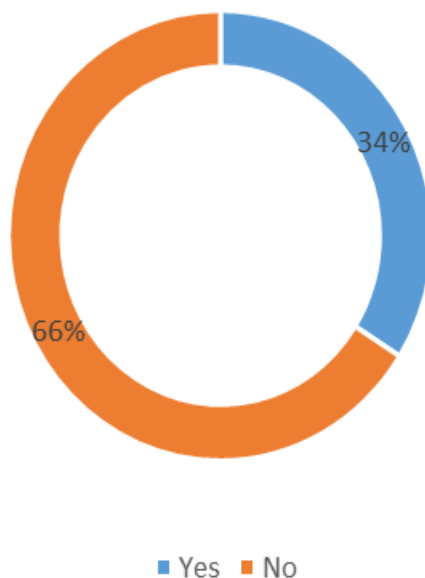
### Results

**Baseline demographic and social characteristics:** A total of 300 adolescents were included in the study. The mean age was  $15.42 \pm 1.39$  years. Participants aged 15–16 years constituted the largest group (43.3%), followed by those aged 13–14 years (30.6%) and those aged 17 years (26.0%). Boys accounted for 76.3% of the study population and girls for 23.7%. Half of the participants were in higher secondary education (50.0%). With respect to working status, 51.3% were school-going and 48.3% were working. Most participants belonged to joint families (76.7%), were Hindu (69.7%), and belonged to the lower socioeconomic class (62.3%).

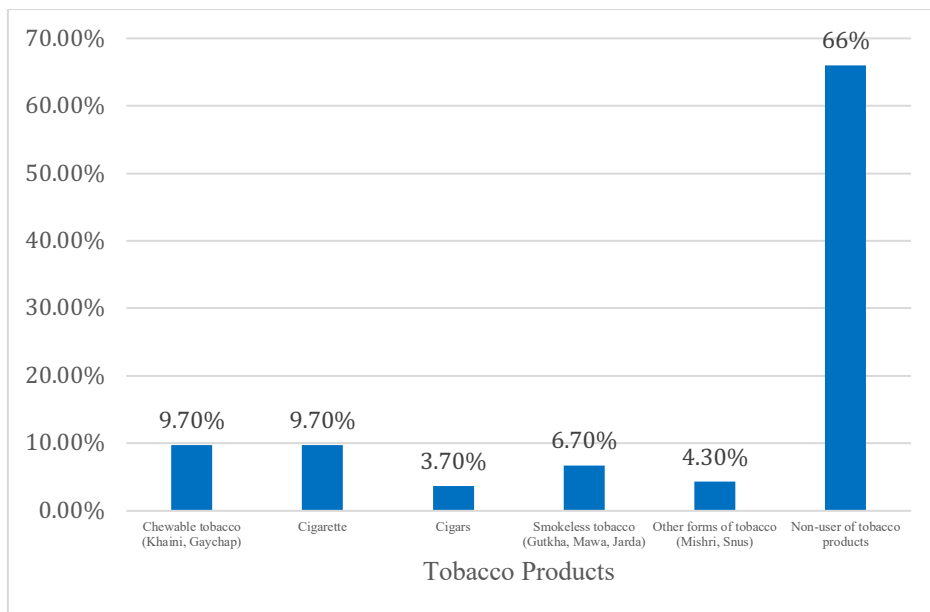
**Table 1: Baseline demographic and social characteristics of the study participants (n=300)**

Variable	Category	n (%)
Age group (years)	13–14	92 (30.6)
	15–16	130 (43.3)
	17	78 (26.0)
Sex	Boys	229 (76.3)
	Girls	71 (23.7)
Education status	Primary	51 (17.0)
	Secondary	99 (33.0)
	Higher secondary	150 (50.0)
Working status	School going	154 (51.3)
	Working	145 (48.3)
	Not working	1 (0.3)
Family type	Joint	230 (76.7)
	Nuclear	70 (23.3)
Religion	Hindu	209 (69.7)
	Muslim	43 (14.3)
	Christian	21 (7.0)
	Other	27 (9.0)
Socioeconomic status	Lower class	187 (62.3)
	Middle class	65 (21.7)
	Upper class	48 (16.0)

**Pattern of tobacco use:** Ever use of tobacco was reported by 102 participants (34.0%), whereas 198 participants (66.0%) had never used tobacco.

**Figure 1: Prevalence of Tobacco Use among Adolescents**

Chewable tobacco and cigarettes were the most commonly reported products, each used by 29 participants (9.7%). Smokeless tobacco products such as gutkha, mawa, and jarda were reported by 20 participants (6.7%), cigars by 11 participants (3.7%), and other forms including mishri and snus by 13 participants (4.3%).



**Figure 2: Type of Tobacco Products Used by Study Participants**

Regarding frequency of use, 40 participants (13.3%) reported daily use, 12 (4.0%) weekly use, 4 (1.3%) monthly use, and 46 (15.3%) rare use. Tobacco use 1–2 times per day was reported by 13 participants (4.3%), and 3–5 times per day by 20 participants (6.7%). Tobacco use 1–4 times per

month was reported by 16 participants (5.3%), while 23 participants (7.7%) reported use at least 5 times per month.

More than 20 episodes of tobacco use per year were reported by 11 participants (3.7%).

**Table 2: Prevalence, type, and frequency of tobacco use among the study participants (n=300)**

Variable	Category	n (%)
Ever use of tobacco	Yes	102 (34.0)
	No	198 (66.0)
Type of tobacco used	Chewable tobacco (Khaini, Gaychap)	29 (9.7)
	Cigarette	29 (9.7)
	Cigars	11 (3.7)
	Smokeless tobacco (Gutkha, Mawa, Jarda)	20 (6.7)
	Other forms (Mishri, Snus)	13 (4.3)
	Non-user of tobacco products	198 (66.0)
Frequency of tobacco use	Daily	40 (13.3)
	Weekly	12 (4.0)
	Monthly	4 (1.3)
	Rarely	46 (15.3)
	Not applicable	198 (66.0)
Frequency per day	0 times	69 (23.0)
	1–2 times	13 (4.3)
	3–5 times	20 (6.7)
	Not applicable	198 (66.0)
Frequency per month	0 times	69 (23.0)
	1–4 times	16 (5.3)
	≥5 times	23 (7.7)
	Not applicable	198 (66.0)
Frequency per year	0 times	69 (23.0)
	1–10 times	10 (3.3)
	11–20 times	12 (4.0)
	>20 times	11 (3.7)
	Not applicable	198 (66.0)

**Social exposure, accessibility, attitudes, and quitting intention:** Friends or family members using tobacco were reported by 180 participants (60.0%). Observation of others using tobacco was reported often by 119 participants (39.6%), sometimes by 30 (10.0%), and rarely by 151 (50.3%). Tobacco products were reported to be very easily available by 186 participants (62.0%) and easily available by 71 (23.7%), whereas 34

participants (11.3%) reported that purchase was not possible. Support for restricting tobacco advertisements and for higher taxation was reported by all participants.

Consideration of quitting tobacco was reported by 53 participants (17.7%), whereas 49 (16.3%) reported no intention to quit. Media influence on tobacco use was reported by 212 participants (70.7%).

**Table 3: Social exposure, availability, attitudes, intention to quit, and media influence among the study participants (n=300)**

Variable	Category	n (%)
Friends/family members using tobacco	Yes	180 (60.0)
	No	120 (40.0)
Seeing others use tobacco	Often	119 (39.6)
	Sometimes	30 (10.0)
	Rarely	151 (50.3)
Ease of availability of tobacco products	Very easily available	186 (62.0)
	Easily available	71 (23.7)
	With difficulty	9 (3.0)
	Not possible to buy	34 (11.3)
Attitude towards tobacco control measures	Support advertisement restriction	300 (100)
	Support higher taxation	300 (100)
Intention to quit tobacco	Yes	53 (17.7)
	No	49 (16.3)
	Not applicable	198 (66.0)
Influence of media on tobacco use	Yes	212 (70.7)
	No	88 (29.3)

**Association of tobacco use with demographic factors:** No statistically significant association was observed between sex and ever tobacco use ( $\chi^2=2.824$ ,  $df=1$ ,  $p=0.093$ ).

However, the proportion of ever tobacco use was higher among girls (42.3%) than boys (31.4%). Ever tobacco use increased significantly across age groups ( $\chi^2=21.613$ ,  $df=4$ ,  $p<0.001$ ), from 16.5%

among participants aged 13–14 years to 36.9% among those aged 15–16 years and 48.7% among those aged 17 years. Ever tobacco use was reported by 26.6% of school-going adolescents and 42.1% of working adolescents. Across socioeconomic strata, reported ever use was 10.7% in the lower class, 80.0% in the middle class, and 62.5% in the upper class.

**Table 4. Distribution of ever tobacco use by sex, age group, occupation, and socioeconomic status (n=300)**

Variable	Category	Never used tobacco n (%)	Ever used tobacco n (%)	Total n (%)
Sex	Female	41 (57.7)	30 (42.3)	71 (100)
	Male	157 (68.6)	72 (31.4)	229 (100)
Age group (years)	13–14	76 (83.5)	16 (16.5)	92 (100)
	15–16	82 (63.1)	48 (36.9)	130 (100)
	17	40 (51.3)	38 (48.7)	78 (100)
Occupation	School going	113 (73.4)	41 (26.6)	154 (100)
	Working	84 (57.9)	61 (42.1)	145 (100)
	Not working	1 (100.0)	0 (0.0)	1 (100)
Socioeconomic status	Lower class	167 (89.3)	20 (10.7)	187 (100)
	Middle class	13 (20.0)	52 (80.0)	65 (100)
	Upper class	18 (37.5)	30 (62.5)	48 (100)

**Knowledge, attitude, and practice analysis:** In the cross-tabulation analysis, ever tobacco use was reported by 34.0% of participants. Exposure to

tobacco use by family or friends was not significantly associated with self-use ( $\chi^2=0.14$ ,  $df=1$ ,  $p=0.71$ ). In contrast, observational exposure

was significantly associated with self-use ( $p=0.036$ ), with the highest prevalence of ever use among those who reported sometimes seeing others use tobacco (44.6%). Awareness of health risks was not significantly associated with self-use ( $p=1.00$ ).

Similarly, belief that tobacco is harmful was not associated with self-use ( $p=1.00$ ). These findings indicate a clear knowledge-practice gap within the study population.

**Table 5: Association of ever tobacco use with selected knowledge, attitude, and exposure variables (n=300)**

Variable	Category	Never used tobacco n	Ever used tobacco n	% ever users	Statistical test
Family/friends use tobacco	No	95	52	35.4	$\chi^2=0.14$ , df=1, $p=0.71$
	Yes	103	50	32.7	
Seeing others use tobacco	Often	66	28	29.8	$p=0.036$
	Sometimes	51	41	44.6	
	Rarely	81	33	28.9	
Awareness of health risks	No	98	50	33.8	$p=1.00$
	Yes	100	52	34.2	
Belief that tobacco is harmful	No	103	53	34.0	$p=1.00$
	Yes	95	49	34.0	

## Discussion

This study found that one-third of adolescents had ever used tobacco, with ever use reported by 34.0% of participants. Chewable tobacco and cigarettes were the most frequently reported products. Tobacco use increased significantly with age, was more common among working adolescents than school-going adolescents, and showed a significant association with observational exposure to tobacco use. Despite substantial awareness of tobacco-related harm and universal support for tobacco control measures, awareness and belief in harm were not associated with reduced tobacco use.

The prevalence observed in the present study was higher than that reported in school-based studies from Delhi, Patna, Bangalore, and other Indian settings, where ever or current use estimates were generally lower. [7–10] The prevalence was, however, close to the higher prevalence reported in Chennai schoolchildren. [11] The higher prevalence in the present study may be related to the inclusion of both school-going and working adolescents, along with the influence of social exposure and easy access to tobacco products. The finding that chewable tobacco and cigarettes were the most common forms is consistent with previous Indian studies showing coexistence of smoked and smokeless tobacco products among adolescents. [7,11,12]

The age-related increase in tobacco use was also consistent with earlier reports showing greater experimentation and regular use with advancing adolescence. [8,10] Sex was not significantly associated with tobacco use in this study, which differs from several earlier studies showing higher

use among boys. [10,13,14] This may reflect a narrowing sex differential in this population. The present study also demonstrated the importance of social exposure and product accessibility. Similar observations have been reported in rural Maharashtra, rural Wardha, and Bangladesh, where social modelling, peer influence, and ease of purchase were linked to adolescent tobacco use. [15–17]

The absence of an association between knowledge and behaviour supports the view that awareness alone is insufficient to prevent experimentation or regular use. Adolescent tobacco control strategies should therefore extend beyond information delivery and include behavioural interventions, school-based preventive programmes, family engagement, peer-led initiatives, and stronger enforcement of age restrictions and point-of-sale regulations. [18]

**Strengths and limitations:** A strength of this study is the inclusion of adolescents from different demographic strata using stratified random sampling and a structured questionnaire. The study also examined tobacco use together with knowledge, attitudes, social exposure, and availability, allowing a broader assessment of adolescent tobacco-related behaviour.

This study has important limitations. Its cross-sectional design precludes causal inference. Tobacco use was self-reported and may therefore be subject to recall bias or social desirability bias. In addition, the study was conducted in selected schools in Mathura district, which may limit wider generalisability.

## Conclusion

Tobacco use was common among adolescents in this study population, with one in three participants reporting ever use. Use increased significantly with age, and the most commonly reported products were chewable tobacco and cigarettes. Observational exposure to tobacco use and easy product availability appeared to be important correlates, whereas knowledge of health risks alone did not translate into behaviour change. These findings support the need for adolescent-focused tobacco prevention and cessation strategies that address social exposure, accessibility, and behavioural determinants in addition to awareness.

## Declarations

### Acknowledgments

The authors thank the participating adolescents, their parents or guardians, school authorities, and the Department of Paediatrics for their cooperation and support.

### Author contributions

Dr Pawar Akshay Shahaji contributed to study conception and design, data collection, data analysis, interpretation of data, and manuscript drafting.

Dr Manoj Kumar Singh contributed to study supervision, methodological guidance, critical revision of the manuscript, and final approval of the version to be published.

Dr Saurabh Singh contributed to data collection, literature review, data interpretation, and manuscript editing.

Dr Pankaj Kumar Jain contributed to study design, academic supervision, critical revision of the manuscript, and final approval of the version to be published.

### Ethics approval and consent to participate

Institutional Ethics Committee approval was obtained before participant recruitment. Written informed consent from parents or guardians and informed assent from participants were obtained.

### Consent for publication

Not applicable. No identifying personal information has been included in this manuscript.

### Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

## References

1. World Health Organization. Tobacco [Internet]. Geneva: WHO; 2024 [cited 2025 Jun 11].

2. National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General [Internet]. Atlanta (GA): Centers for Disease Control and Prevention (US); 2012 [cited 2023 Nov 19].
3. Chassin L, Presson CC, Sherman SJ. Cigarette smoking and adolescent psychosocial development. *Basic Appl Soc Psychol*. 1984;5(4):295-315.
4. Mistry R, Pednekar MS, Gupta PC, Raghunathan TE, Appikatla S, Puntambekar N, et al. Longitudinal study of adolescent tobacco use and tobacco control policies in India. *BMC Public Health*. 2018;18(1):815.
5. Corsi DJ, Subramanian SV. Divergent socio-economic gradients in smoking by type of tobacco use in India. *Int J Tuberc Lung Dis*. 2014;18:122-4.
6. Singh A, Arora M, Bentley R, Spittal MJ, Do LG, Grills N, et al. Geographic variation in tobacco use in India: a population-based multilevel cross-sectional study. *BMJ Open*. 2020;10(6):e033178.
7. Kumar V, Talwar R, Roy N, Raut D, Singh S. Psychosocial determinants of tobacco use among school going adolescents in Delhi, India. *J Addict*. 2014;2014:170941.
8. Singh G, Sinha DN, Sarma PS, Thankappan KR. Prevalence and correlates of tobacco use among 10-12 year old school students in Patna District, Bihar, India. *Indian Pediatr*. 2005;42(8):805-10.
9. Bhojani UM, Chander SJ, Devadasan N. Tobacco use and related factors among pre-university students in a college in Bangalore, India. *Natl Med J India*. 2009;22(6):294-7.
10. Sharma R, Grover VL, Chaturvedi S. Tobacco use among adolescent students and the influence of role models. *Indian J Community Med*. 2010;35(2):272-5.
11. Madan Kumar PD, Poorni S, Ramachandran S. Tobacco use among school children in Chennai city, India. *Indian J Cancer*. 2006;43(3):127-31.
12. Goyal LD, Verma M, Garg P, Bhatt G. Variations in the patterns of tobacco usage among Indian females: findings from the global adult tobacco survey India. *BMC Womens Health*. 2022;22(1):442.
13. Radhika AG, Preetha GS, Neogi S. Need for gender focused policies addressing smokeless tobacco use among women in India: a review. *Asian Pac J Cancer Prev*. 2021;22(S2):7-12.
14. Jaisooriya TS, Beena KV, Beena M, Jose DC, Ellangovan K, Thennarasu K, Benegal V. Prevalence and correlates of tobacco use among adolescents in Kerala, India. *Indian J Med Res*. 2016;144(5):704-11.

15. Majumdar R, Raje SS, Dandekar A. Socio demographic factors associated with tobacco use in rural Maharashtra. *Med J Dr DY Patil Univ.* 2013;6(2):161-4.
16. Dongre A, Deshmukh P, Murali N, Garg B. Tobacco consumption among adolescents in rural Wardha: where and how tobacco control should focus its attention? *Indian J Cancer.* 2008;45(3):100-6.
17. Islam SM, Mainuddin AK, Bhuiyan FA, Chowdhury KN. Prevalence of tobacco use and its contributing factors among adolescents in Bangladesh: results from a population-based study. *South Asian J Cancer.* 2016;5(4):186-8.
18. Lakshmi JK, Shrivastav R, Saluja K, Arora M. Evaluation of a school-based tobacco control intervention in India. *Health Educ J.* 2020;79(7):775-87.