

Awareness of Smoking Tobacco among Dental College Students: A Questionnaire-based Cross-sectional Study

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ABSTRACT

Introduction: Tobacco smoking is one of the 10th leading health indicators proposed by the World Health Organisation (WHO) Healthy People 2020, with major concerns regarding increased mortality rates. Tobacco smoke contains 2.94 mg of nicotine, 802 mg of tar, 145 mg of carbon monoxide, and greater quantities of chrysene. Hookah tobacco poses a serious health threat because of the commonly held belief among college students that this tobacco product is not addictive. Assessing practices represents an important starting point in curbing the spread of tobacco use. It is crucial to understand the use, patterns, and dependence on tobacco to develop appropriate prevention and cessation strategies.

Aim: To assess tobacco smoking-related knowledge, attitudes, and practices among students of dental Institutions in Lucknow city, Uttar Pradesh, India.

Materials and Methods: A descriptive cross-sectional study was conducted among five dental colleges in Lucknow city from July 2023 to November 2023. A total of 1050 undergraduate dental students were included in the study, and a self-structured, close-ended questionnaire was used to collect information on

the knowledge, attitudes, and practices of hookah tobacco. The reliability of the questionnaire was evaluated using Cronbach's coefficient alpha to measure internal consistency, which was found to be 0.9. Discrete (categorical) data were summarised in numbers (n) and percentages (%). Categorical groups were compared by Chi-square (χ^2) test.

Results: Out of the total 1050 students, 392 (37.3%) were aged between 18-21 years, 630 (60.0%) were aged between 22-25 years, and 28 (2.7%) were aged between 26-30 years. Furthermore, among the students, 355 (33.8%) were females and 695 (66.2%) were males. Among the total of 1050 dental students, the prevalence of hookah smoking was 59.1%. The presence or prevalence of hookah smoking was higher in males (29.4%) at 480 (45.7%) than in females 141 (13.4%), and the difference was statistically significant ($\chi^2=83.75$, $p<0.001$).

Conclusion: The study found that the frequency of hookah smoking continues to increase with the increasing age of the participants. The study also revealed the alarming situation of a high prevalence of hookah smoking among dental college students.

Keywords: Addictive, Hookah, Institutions, Prevalence, Professionals, Shisha

INTRODUCTION

In India, there are a variety of forms of tobacco available in the form of gutka, snuff, snus, mawa, mishri, khaini, zarda, and smoking forms like cigarettes, hookah, bidi, and cigars, which are socially acceptable and can be used in public places. By the year 2030, it is projected that the annual death toll resulting from tobacco smoking could soar to as high as 8.3 million individuals [1]. India is the third largest tobacco-producing nation and the second largest consumer of tobacco worldwide. The estimated mortality resulting from tobacco use in India exceeds the substantial threshold of 1.3 million [2].

While the majority of research efforts have been directed towards cigarettes, the growing trend of hookah consumption has garnered notably less attention [3]. The utilisation of hookah for tobacco smoking traces its origins back to the court of Emperor Akbar during the late 10th century [4]. It was introduced in the 16th century by a physician named Hakim Abul-Fath Gilani. The purpose of the device was to pass smoke through water in an attempt to 'purify' the smoke, an unproven concept that has been repeatedly questioned by the medical community [5]. In the 17th century, hookah had become a part of Persian culture, where a strong, dark leaf tobacco called 'Ajami' and 'Jurak', usually mixed with fruits or oils, was used [6]. The tobacco industry has introduced new flavourings to water pipe tobacco, such as fruit, chocolate, mint, etc., to appeal to young women [7,8].

A cigarette usually produces 500-600 mL of smoke, while a hookah produces 5000 mL of smoke [9]. Several toxicants are found in hookah smoke, including carbon monoxide, nicotine, aldehydes, aromatic amines, phenolic compounds, tar, carcinogenic polycyclic

aromatic hydrocarbons, heavy metals, particulate matter, and ammonia. Hookah smoke contains 2.94 mg nicotine, 802 mg tar, 145 mg carbon monoxide, and greater quantities of chrysene, phenanthrene, and flour-anthrene [10]. Hookah tobacco poses a serious health threat because there is a common belief among college students that this tobacco product is innocuous and non-addictive [3]. Sharing the same mouthpieces of a hookah can help spread infectious diseases, such as hepatitis B, bleeding gums, infectious mononucleosis, tuberculosis, herpes, influenza, pneumonia in immune-compromised patients [11].

Assessing practices and opinions among dental college students represents an important starting point to curb the spread of hookah use. It is also very important to understand its use patterns and dependence to develop appropriate prevention and cessation strategies. Extensive work on cigarette smoking has been published in India [11-13], but very little research exists on hookah smoking, especially among Dental Health Professionals [14]. The results of present study will be useful to practitioners in designing intervention strategies for this vulnerable group of the population. In order to address this emerging health risk, the present study was conducted to determine the knowledge, attitude, and practice of hookah smoking among students of various dental educational Institutions in Lucknow city.

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted among five dental college students in Lucknow city from July 2023 to November 2023.

The study was approved by the Institutional Ethical Committee of the College (IEC approval no: SDC/IRDC/027). Verbal consent was obtained from each participant before the commencement of the study. The objectives of the study were explained to the participants, and confidentiality was assured.

Inclusion criteria: Undergraduate dental students (1st year, 2nd year, 3rd year, final year, and interns), both male and female, who were present on the day of the study and willing to participate, were enrolled.

Exclusion criteria: Postgraduate students, participants who were unwilling to participate, and those with incomplete questionnaires were excluded from the study.

Sample size calculation: The prevalence of hookah smokers was 10.5%, among medical students in a previous study conducted in Gujarat state (India) [12] and was used to calculate the sample size.

The sample size was estimated as $(n)=1+2C (SD/d)^2$
 $=1+2*10.51*(1.50/1.15)^2$ (for $\alpha=0.05$ and $1-\beta=0.80$, where the constant $C=10.51$).

Based on the results obtained, the sample size was fixed at 1050. A total of 210 students were examined from each college using cluster random sampling technique.

Study Procedure

Prior to the commencement of the main study, a pilot study was conducted to check the feasibility and validity of the study on 50 subjects. A self-structured, pretested, close-ended questionnaire was used to collect information regarding the knowledge, attitude, and practice of hookah smoking among dental college students in Lucknow city. The questionnaire was written in English to ensure easy understanding by the participants. The reliability of the questionnaire was evaluated by Cronbach's coefficient alpha to measure internal consistency, and it was found to be 0.9. The Test-retest method was used to examine the questionnaire's reliability, with the internal consistency found to be good at 0.87.

The proforma used in the study, based on previous studies [14,15], comprised of four parts:

- The first part included demographic details.
- The second part consisted of six questions related to the knowledge of hookah smoking among dental college students.
- The third part included six questions assessing the attitude of dental college students towards hookah smoking.
- The fourth part contained 6 questions that included practice of hookah smoking among participants.

Data collection was conducted through interviews, with each session lasting 10 minutes for each professional. The scoring criteria ranged from 0 to 6 for each variable.

STATISTICAL ANALYSIS

The completed questionnaire was duly collected, compiled and subjected to statistical analysis. Discrete (categorical) data were summarised in numbers (n) and percentages (%). Categorical groups were compared using the Chi-square (χ^2) test. A two-tailed ($\alpha=2$) p-value <0.05 was considered statistically significant. The analysis was performed using Statistical Packages for the Social Sciences (SPSS) software (Windows version 22.0).

RESULTS

In the present study, out of a total of 1050 dental students, 392 (37.3%) students were aged 18-21 years, 630 (60.0%) students were aged 22-25 years (the maximum), and 28 (2.7%) students were aged 26-30 years (the minimum). Furthermore, 210 (20.0%) students were in the 1st year, 210 (20.0%) in the 2nd year, 210 (20.0%) in the 3rd year, 210 (20.0%) in the final year, and 210 (20.0%) were in internship, respectively. Among the students, 355 (33.8%) were females, and

695 (66.2%) were males. Out of the total 1050 dental students, 429 (40.9%) were non hookah smokers, and 621 (59.1%) were hookah smokers. Thus, the prevalence of hookah smoking among dental college students was 59.1%. Moreover, 485 (46.2%) students were day scholars, 364 (34.7%) were hostel residents, and 201 (19.1%) were residing as paying guests [Table/Fig-1].

Comparing the prevalence of hookah smoking (no/yes) between different age groups, the frequency of hookah smoking among different age groups did not differ significantly. The prevalence of hookah smoking was higher in males 480 (45.7%) compared to females 141 (13.4%), and the difference was statistically significant ($p<0.001$) [Table/Fig-1].

Demographic characteristics	Total students (N=1050) (%)	Yes (n=621)	No (n=429)	p-value
Age (years)				
18-21	392 (37.3)	233 (22.1)	159 (15.1)	0.9
22-25	630 (60.0)	371 (35.3)	259 (24.6)	
26-30	28 (2.7)	17 (1.6)	11 (1.04)	
Gender				
Female	355 (33.8)	141 (13.4)	214 (20.3)	0.001
Male	695 (66.2)	480 (45.7)	215 (20.4)	
Day scholar	485 (46.2%)	288 (27.43%)	197 (18.7%)	0.9
Hosteller	364 (34.7%)	205 (19.5%)	159 (15.1%)	
Postgraduate	201 (19.1%)	128 (12.1%)	73 (6.9%)	

[Table/Fig-1]: Demographic characteristics of dental college students and the prevalence of hookah smoking among dental college students according to their age and gender.

The knowledge (K1 to K6) about hookah smoking among dental college students has been presented in [Table/Fig-2]. In the present study, when asked "Is hookah smoking more harmful than cigarettes (K1)?" 760 (72.3%) responded yes. Similarly, for "Is hookah smoking more addictive than cigarettes (K2)?" 630 (60.0%) responded yes.

Knowledge about hookah	Yes	No
Is hookah smoking more harmful than cigarettes (K1)	760 (72.3%)	290 (27.6%)
Is hookah smoking more addictive than cigarettes (K2)	630 (60.0%)	420 (40.0%)
Is shisha smoking contains nicotine, tar, carbon-monoxide (CO) (K3)	716 (68.1%)	334 (31.8%)
Do you know that hookah smoking leads lung cancer, oral cancer, cardiovascular diseases, tuberculosis and other communicable diseases (K4)	667 (63.5%)	383 (36.4)
Do you believe that water in hookah smoking filters toxins (K5)	670 (63.8%)	380 (36.1%)
Are you aware about health hazards caused by hookah smoking (K6)	681 (64.8%)	369 (35.1%)

[Table/Fig-2]: Frequency distribution of knowledge (K1 to K6) about hookah smoking among dental college students.

In the present study, the attitudes of students were described as follows: most participants who smoke hookah (26.7%) believed it to be a stress reliever, followed by 17.1% and 15.3% who smoke for a pleasurable experience and to feel intimate in social gatherings. The possible reason behind this result was positive social attitudes related to hookah smoking when compared with smoking cigarettes [Table/Fig-3].

The practices (P1 to P6) towards hookah smoking among dental college students are summarised in [Table/Fig-4].

In the current study, when asked about the frequency of hookah usage, most students smoke once a week, followed by occasionally and once a month. Most smokers preferred to smoke hookah with their family and friends at leisure places. In the present study, the average length of a shisha smoking session was found to be more than 45 minutes [Table/Fig-4].

Attitude of students	Yes	No
Shisha smoking is stress reliever	770 (73.3%)	280 (26.7%)
Do you smoke shisha for pleasurable experience	870 (82.8%)	180 (17.1%)
Do you smoke shisha intimacy in social gatherings	889 (84.6%)	161 (15.3%)
Do you put any efforts to stop hookah smoking	688 (65.5%)	362 (34.5%)
Do you think that there should be any regulation on hookah smoking	380 (36.1%)	670 (63.8%)
Are you more comfortable in hookah smoking	731 (69.6%)	319 (30.2%)

[Table/Fig-3]: Frequency distribution of attitude towards shisha smoking among dental college students.

Practices	Total students (N=1050) (%)
P1. What is your frequency of shisha usage?	
Occasionally	202 (19.2)
Once in a week	281 (26.8)
Once in a month	138 (13.1)
Do not smoke	429 (40.9)
P2. Preference with whom do you like to smoke shisha?	
With family at home	46 (4.4)
With friends and family at a leisure place	401 (38.2)
Anywhere, anyone it does not matter	174 (16.6)
Do not smoke	429 (40.9)
P3. What is the average length of session of shisha smoking?	
Less than 45 min	196 (18.7)
More than 45 min	317 (30.2)
Time doesn't matter	108 (10.3)
Do not smoke	429 (40.9)
P4. Your age of starting shisha smoking?	
10-15 y	34 (3.2)
15-20 y	395 (37.6)
20-25 y	192 (18.3)
Do not smoke	429 (40.9)
P5. What would be the cost of shisha?	
Equal to that of cigarettes	62 (5.9)
Less than that of cigarettes	137 (13.0)
More than that of cigarettes	713 (67.9)
Cost doesn't matter	138 (13.1)
P6. Do you use newest alternatives of smoking?	
E-cigarettes	314 (29.9)
Hookah pen/vape pen	229 (21.8)
None	78 (7.4)
Do not smoke	429 (40.9)

[Table/Fig-4]: Frequency distribution of practices towards shisha smoking among dental college students (N=1050).

DISCUSSION

The "emerging epidemic" of water pipe smoking is a dangerous trend. As hookah use is spreading among college students, it is important to examine the reasons for and characteristics of hookah use in this age group. The significance of present study lies not only in measuring the prevalence of hookah smoking but also in conducting a comprehensive examination of the knowledge, attitudes, and practices towards hookah use among dental college students who will become healthcare practitioners in the future. In the present study, the prevalence of hookah smoking among dental college students in Lucknow city was found to be 59.1%. This prevalence was higher compared to previous studies conducted by Dar-Odeh NS et al., (2010), where the prevalence of current hookah smoking was reported to be 44.1% [13]. Contrasting results were reported by Omotehinwa OJ et al., (2018) [16] and Rami K et

al., (2015) [12], with the former reporting a prevalence of hookah smoking among medical students at 20.8% and the latter at 10.5%. The higher prevalence of hookah consumption among the study participants might be due to people's misconception about the safety of hookah and its greater social acceptance than cigarettes.

In the present study, it was found that the frequency of hookah smoking continues to increase with the age of the participants. This observed relationship might be due to participants' desire to obtain social acceptance, curiosity, the availability of different flavours, misconceptions about the safety of hookah, and the relatively low cost of hookah. The overall prevalence of hookah smoking is higher in males (69.1%) than in females (39.7%). Similar findings have been reported in other studies by Al-Rawi NH et al., (2018) [1] and Eissenberg T et al., (2008) [17], where males were more likely than females to be water pipe smokers (43.3% and 55.4%, respectively).

Contrasting results were reported by Abu-Helalah MA et al., (2015) [18] and Dar-Odeh NS et al., (2010) [13]. This difference may be due to the positive social image of hookah among males. Students residing in on-campus housing were found to smoke water pipe at higher frequencies, likely due to the lack of parental guidance. Students who are staying as paying guests and day scholars have restrictions related to smoking; therefore, they hang out with their friends in lounges, bars, and cafes for hookah smoking. The difference was statistically significant ($p < 0.05$). Prabhu A et al., (2017) [19] found an insignificant relationship between housing situations and smoking status. Similar findings have been supported by studies conducted by Gfroerer JC et al., (1997) [20] and Adlaf EM et al., (2003) [21].

In the present study, the majority of dental college students had good knowledge about the harmfulness (63.9%) and addictiveness (73.4%) of hookah smoking. Similar findings were reported by Hanna R et al., (2014) [22] and Allohidan F et al., (2017) [15], where the majority of students believed that hookah smoking was more harmful than cigarette smoking. Contrasting results have been reported in studies conducted by Maziak W et al., (2004) [23] and Primack BA et al., (2009), where the majority of students believed that shisha smoking was less harmful than cigarettes, and hookah smokers were not susceptible to addiction [24]. The majority of the participants (67.3%) had knowledge that hookah smoke contains nicotine, tar, and carbon monoxide. Similar findings were reported by Daher N et al., (2010) [25], Kassem NO et al., (2014), and Blachman-Braun R et al., (2014) [26,27], where they reported that the side stream smoke of hookah contains nicotine, acrolein, and had nearly four times the carcinogenic polycyclic aromatic hydrocarbons, volatile aldehydes, and 30 times the carbon monoxide of one cigarette smoke. There was a substantial knowledge gap among first, second, and third-year students compared to final year and intern students, as the vast majority of participants were unaware of the toxin load associated with hookah smoking.

In the present study, nearly half of the students (49.8%) believed that water in the shisha filters toxins. Most of the students thought that water pipe smoke contains less tar, nicotine, and other toxins due to the "purification" that occurs when the smoke passes through water before being inhaled by the user. The current study showed inadequate knowledge regarding the health consequences of hookah smoking among students. Singh PN et al., (2012) [28], Amin TT et al., (2017), and Jaam M et al., (2016) were in agreement with the findings of the current study [29,30]. Raad D et al., (2011) and Chaouachi KT et al., (2007) in their study reported that chronic use of hookah, with a frequency of one or more hookah sessions per day, can lead to Chronic Obstructive Pulmonary Disease (COPD) [31,32].

In the coeval study, most of the participants involved in hookah smoking (26.7%) believed it to be a stress reliever, followed by 17.1% and 15.3% who smoke for a pleasurable experience and to gain intimacy in social gatherings. In the contemporary study,

around 52.2% of the participants thought that females were more comfortable smoking hookah compared to cigarettes. The possible reason behind this result was the positive social attitudes related to hookah smoking when compared with smoking cigarettes. Comparable results were reported by Chaouachi KT et al., [32]. The majority of the respondents stressed the need for policy implementation, and one-third believed that awareness programmes should be carried out to make students aware about misconceptions and myths regarding hookah use as a non-tobacco and non-nicotine product.

Without national legislation to regulate these products, the tobacco industry has spearheaded surreptitious promotional campaigns to market these products, exploiting gullible consumers [33]. A good proportion of students had restarted smoking hookah after quitting because of addiction, high availability, conducive social setups, easy affordability, and low perceived health risks. Al-Hashel D et al., (2012) reported that one-third of the smokers (33%) stated tobacco craving as the primary reason for their inability to quit hookah smoking [34].

In the current study, when asked about the frequency of hookah usage, most of the students smoke once a week, followed by occasionally and once a month. This was consistent with the findings reported by Aanyu C et al., (2019) and Ahmed B et al., (2011), where smokers used hookah weekly at cafes and bars in the company of their friends [35,36]. Almerie MQ et al., (2008) reported that occasional hookah smoking was the predominant pattern of use, and higher waterpipe tobacco smoking frequency was associated with physiological dependence, psychological craving, and positive reinforcement [37].

In the present study, most of the smokers (38.2%) preferred to smoke hookah with their family and friends at a leisure place. Similar findings were reported by Amin TT et al., (2010) [29], where the primary motive was outing with friends for boredom relief and a way of passing time. In the present study, 30.2% reported that the average length of a hookah smoking session was more than 45 minutes, and 18.7% reported it to be less than 45 minutes. Al-Delaimy AK and Al-Ani WAT (2021), and Shihadeh A (2003) reported similar findings, where three quarters of adolescents reported hookah smoking for 30 minutes or more at each session [38,39]. The majority of the hookah smokers in the present study started hookah smoking at 15-20 years of age, and nearly one-fourth of them (18.3%) started at 20-25 years. The majority of the participants (67.9%) considered the cost of hookah to be more than that of cigarettes, followed by 13% who considered it to be less. For students who do not have adequate allowance, higher prices could help in reducing their consumption. This could become an effective way to reduce hookah smoking among students.

In the present study, most of the hookah smokers used E-cigarettes as a newer alternative to smoking. This might be due to the easy availability of these devices, alluring advertisements, various e-liquid flavours, low risk of addiction, and the belief that they are safer than cigarettes. Owens VL et al., (2019) and Sakuma KK et al., (2020) have reported that E-cigarettes are available in a variety of flavours, which increases sensory appeal and stimulates smoking initiation [40,41].

Limitation(s)

The present small convenience sample was taken from a particular city and may not be generalisable to all college students across Uttar Pradesh.

CONCLUSION(S)

The study also revealed the alarming situation of high prevalence of hookah smoking among dental college students. Most of the hookah smokers used E-cigarettes as a newer alternative

to smoking due to the easy availability of these devices, alluring advertisements, various e-liquid flavours, low risk of addiction, and the belief that they were safer than cigarettes. Hence, it provides effective information to authorities and health policymakers to better understand the harmful health effects and misconceptions of hookah use. Increased surveillance and additional research are necessary to address this growing public health threat. Evidence-based public health and policy strategies are required to equip the youth and the public about the effects of hookah smoking. Tobacco cessation programmes should be incorporated into various healthcare programmes running in dental colleges.

REFERENCES

- [1] Al-Rawi NH, Alnuaimi AS, Uthman AT. Shisha smoking habit among dental school students in the United Arab Emirates: Enabling factors and barriers. *Int J Dent*. 2018;2018:2805103.
- [2] Tata Institute of Social Sciences (TISS), Mumbai and Ministry of Health and Family Welfare, Government of India. *Global Adult Tobacco Survey GATS 2 India 2016-17*. ISBN: 978-81-937917-0-7.
- [3] Al-Naggar RA, Bobryshev YV. Shisha smoking and associated factors among medical students in Malaysia. *Asian Pac J Cancer Prev*. 2012;13(11):5627-32.
- [4] Ray CS. The hookah—the Indian waterpipe. *Current Science*. 2009;96(10):1319-23.
- [5] Kadhum M, Sweidan A, Jaffery AE, Al-Saadi A, Madden B. A review of the health effects of smoking shisha. *Clin Med*. 2015;15(3):263.
- [6] Mohammed HT. The efficacy of viewing health warnings on shisha smoking among shisha smokers. *Int J Adv Med*. 2015;2(4):400-20.
- [7] Arshad A, Matharoo J, Arshad E, Sadhra SS, Norton-Wangford R, Jawad M, et al. Knowledge, attitudes, and perceptions towards waterpipe tobacco smoking amongst college or university students: A systematic review. *BMC Public Health*. 2019;19(1):439.
- [8] Perry CL, Eriksen MP, Giovino G. Tobacco use: A pediatric epidemic. *Tobacco Control*. 1994;3:97-98.
- [9] Momenabadi V, Hashemi SY, Borhaninejad VR. Factors affecting hookah smoking trend in the society: A review article. *Addict Health*. 2016;8(2):123-35.
- [10] Aslam HM, Saleem S, German S, Qureshi WA. Harmful effects of shisha: Literature review. *Int Arch Med*. 2014;7(1):01-09.
- [11] Gathuru IM, Tarter RE, Klein-Fedyshin M. Review of hookah tobacco smoking among college students: Policy implications and research recommendations. *Am J Drug Alcohol Abuse*. 2015;41(4):272-80.
- [12] Rami K, Makvana BJ, Thakor NC. Knowledge, attitude and practices of hookah smoking among medical students in Gujarat, India: A cross sectional study. *Int J Adv Med*. 2015;2(4):397-400.
- [13] Dar-Odeh NS, Bakri FG, Al-Omiri MK. Narghile (water pipe) smoking among university students in Jordan: prevalence, pattern and beliefs. *Harm Reduc J*. 2010;7:707-10.
- [14] Obeidat SR, Khabour OF, Alzoubi KH, Mahasneh AM, Bibars AR, Khader YS, et al. Prevalence, social acceptance, and awareness of waterpipe smoking among dental university students: A cross sectional survey conducted in Jordan. *BMC Research Notes*. 2014;7:832.
- [15] Allohidan F, Alanazi AK, Azzahrani MK, Alrashed MR. Knowledge, practice, and attitudes regarding hookah (water pipe) smoking among college students studying health sciences in Riyadh, Saudi Arabia. *Int J Sci Res*. 2017;5(1):54-65.
- [16] Omotehinwa OJ, Japheths O, Damascene JJ, Habtu M. Shisha use among students in a private university in Kigali city, Rwanda: Prevalence and associated factors. *BMC Public Health*. 2018;18(1):713.
- [17] Eissenberg T, Ward KD, Smith-Simone S, Maziak W. Waterpipe tobacco smoking on a U.S. Collegecampus: Prevalence and correlates. *J Adolesc Health*. 2008;42(5):526-29.
- [18] Abu-Helal MA, Alshraideh HA, Al-Serhan AA, Nesheiwat AI, Da'na M, Al-Nawafleh A. Epidemiology, attitudes and perceptions toward cigarettes and hookah smoking amongst adults in Jordan. *Environ Health Prev Med*. 2015;20(6):422-33.
- [19] Prabhu A, Jain JK, Sakeenabhi B, Kumar PGN, Imranulla M, Ragher M, et al. Smoking cessation advice: Knowledge, attitude, and practice among clinical dental students'. *J Pharm Bioallied Sci*. 2017;9(Suppl 1):S117-20.
- [20] Gfroerer JC, Greenblatt JC, Wright DA. Substance use in the US college-age population: Differences according to educational status and living arrangement. *Am J Public Health*. 1997;87(1):62-65.
- [21] Adlaf EM, Gliksman L, Demers A, Newton-Taylor B. Cigarette use among Canadian undergraduates. *Can J Public Health*. 2003;94(1):22-24.
- [22] Rezk-Hanna M, Macabasco-O'connell A, Woo M. Hookah smoking among young adults in southern California. *Nurs Res*. 2014;63(4):300-06.
- [23] Maziak W, Eissenberg T, Rastam S, Hammal F, Asfar T, Bachir ME. Beliefs and attitudes related to narghile (water pipe) smoking among university students in Syria. *Ann Epidemiol*. 2004;14(9):646-54.
- [24] Primack BA, Walsh M, Bryce C. Water-pipe tobacco smoking among middle and high school students in Arizona. *Pediatrics*. 2009;123(2):e282-88.
- [25] Daher N, Saleh R, Jaroudi E. Comparison of carcinogen, carbon monoxide, and ultrafine particle emissions from narghile waterpipe and cigarette smoking: Side stream smoke measurements and assessment of second-hand smoke emission factors. *Atmos Environ*. 2010;44(1):08-14.

- [26] Kassem NO, Daffa RM, Liles S. Children's exposure to second-hand and thirdhand smoke carcinogens and toxicants in homes of hookah smokers. *Nicotine Tob Res.* 2014;16(7):961-75.
- [27] Blachman-Braun R, Mazo-Rodríguez RLD, López-Sámano G, Buendía-Roldán I. Hookah, is it really harmless? *Respiratory Medicine.* 2014;108(5):661-67.
- [28] Singh PN, Neergaard J, Job JS, El Setouhy M, Israel E, Mohammed MK, et al. Differences in health and religious beliefs about tobacco use among waterpipe users in the rural male population of Egypt. *J Relig Health.* 2012;51(4):1216-25.
- [29] Amin TT, Amr M, Zaza, BO, Suleman W. Harm perception, attitudes and predictors of waterpipe (shisha) smoking among secondary school adolescents in Al-hassa, Saudi Arabia. *Asian Pac J Cancer Prev.* 2011;11(2):293-301.
- [30] Jaam M, Al-Marridi W, Fares H. Perception and intentions to quit among waterpipe smokers in Qatar: A cross-sectional survey. *Public Health Action.* 2016;6(1):38-43.
- [31] Raad D, Gaddam S, Schunemann HJ, Irani J, Abou Jaoude P, Honeine R, et al. Effects of water-pipe smoking on lung function: A systematic review and meta-analysis. *Chest.* 2011;139(4):764-74.
- [32] Chaouachi KT. The narghile (hookah, shisha, goza) epidemic and the need for clearing up confusion and solving problems related with model building of social situations. *Scientific World Journal.* 2007;7:1691-96.
- [33] Shrivastav R, Kathuria P, Arora M, Munish VG, Sinha P, Tullu FT. (Mis)perceptions related to Electronic Nicotine Delivery Systems (ENDS) and hookah: Making a case for policy strengthening through a multi-stakeholder qualitative study from New Delhi, India. *Tob Induc Dis.* 2018;16(Suppl 1):A469.
- [34] Al-Hashel D, Mohammed F, Jaffar K, Selaiti M, Neama S, Mandeel M. Barriers to quit smoking among adult smokers. *Bahrain Med Bull.* 2012;34(4):183-86.
- [35] Aanyu C, Kadobera D, Apolot RR, Kisakye AN, Nsubuga P, Bazeyo W, et al. Prevalence, knowledge and practices of shisha smoking among youth in Kampala City, Uganda. *Pan Afr Med J.* 2019;32:61.
- [36] Ahmed B, Jacob Iii P, Allen F, Benowitz N. Attitudes and practices of hookah smokers in the San Francisco Bay Area. *J Psychoactive Drugs.* 2011;43(2):146-52.
- [37] Almerie MQ, Matar HE, Salam M, Morad A, Abdulaal M, Koulsi A, et al. Cigarettes and waterpipe smoking among medical students in Syria: A cross-sectional study. *Int J Tuberc Lung Dis.* 2008;12(9):1085-91.
- [38] Al-Delaimy AK, Al-Ani WAT. Prevalence of hookah smoking and associated factors among male high school students in Iraq. *BMC Public Health.* 2021;21:1317.
- [39] Shihadeh A. Investigation of mainstream smoke aerosol of the argileh water pipe. *Food Chem Toxicol.* 2003;41(1):143-52.
- [40] Owens VL, Ha T, Soulakova JN. Widespread use of flavoured e-cigarettes and hookah tobacco in the United States. *Preventive Medicine Reports.* 2019;14:100854.
- [41] Sakuma KK, Dolcini MM, Seifert J, Bean MM, Fagan P, Wilson M, et al. Hookah and electronic inhalant device use and perceptions among African American Youth and Young Adults: Are we asking the right questions? *Health Educ Behav.* 2020;47(2):391-40.

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