RESEARCH ARTICLE

REVISED **The extent of formal tobacco cessation training received by student health professionals and the prevalence of tobacco use among them: a cross-sectional study** [version 2; peer review: 1 approved with reservations]

Ashwaghosha Parthasarathi¹ , Raj Kumar², Krishna Undela³, Jayaraj Biligere Siddaiah⁴, Padukudru Anand Mahesh⁴

¹Allergy, Asthma and Chest center, Mysore, Karnataka, 570004, India

²Vallabhbhai Patel Chest Institute, Delhi, 110007, India

³Department of Pharmacy Practice, National Institute of Pharmaceutical Education and Research, Guwahati, Assam, 781101, India

⁴Department of Pulmonology, JSS Medical College, Mysore, Karnataka, 570004, India

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Abstract

Background: Advice from health care professionals (HCPs) is critical for tobacco prevention and cessation efforts. The academic curricula for health care professional students (HCS) lack comprehensive training in assisting patients in tobacco cessation. Tobacco use among HCP's deters them from giving proper tobacco prevention and cessation guidance. The objective of this study was to determine the prevalence and determinants of tobacco consumption in third-year students of four health care disciplines (medical, dental, pharmacy, and nursing) and to assess their undergraduate education on tobacco control and cessation.

Methods: A web-based survey (response rate 84.4%) employing the Global Health Professions Student Survey (GHPSS) questionnaire; n= 838; [20.89 (SD± 0.94) years] was conducted in Mysore, India. A descriptive, comparative and multivariate analysis was performed.

Results: The number of students who received formal training in smoking cessation approaches was only 14.04%. In total, two-thirds of medical students, compared to 38.9% of dental, 29.7% of pharmacy, and 11.40 % of nursing students, learned "the reasons why people smoke" as a part of their formal training. However, only less than a quarter of the study population were aware of the role of antidepressants in nicotine cessation medications. The total prevalence of tobacco use was 28.9%. A total of 37.72% wanted to quit smoking, while a mere 1.2% had sought any professional help to do so.

Conclusions: Tobacco use in HCS, apart from personal health risks to

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themselves, may potentially affect their future commitment to support patients in tobacco cessation. There is a need for further research into tobacco prevention and cessation programs tailored to the needs of student groups. There is a need for an updated curriculum for tobacco cessation strategies and more research into better cessation strategies.

Keywords

tobacco consumption, tobacco use in health care professionals, formal nicotine cessation training

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Corresponding author: Padukudru Anand Mahesh (mahesh1971in@yahoo.com)

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REVISED Amendments from Version 1

The following changes have been done to the new version of this article

- Statistical analysis: more information regarding the tests used and analysis done has been incorporated into this section.
- The descriptive tables now have a column called test statistic showing the chi square value (x) in case of categorical variables and F statistic in case of continuous variable along with the p value.
- A new table on relationship of tobacco cessation and tobacco use has been added. More information on secondhand smoke, use of tobacco among peers and family and cessation method used by those who quit has been added to [Table 1](#). Some of this information is written in the corresponding paragraphs.
- Figure 3 which had the multi variable analysis has been removed. Instead we have added two new tables which show both univariable and multi variable analysis for active tobacco use and for cessation of tobacco use. Furthermore, the multi variable analysis for tobacco cessation methods is now adjusted for age sex and branch of healthcare education. This information is also written in the section "results from multi variable analysis"

Any further responses from the reviewers can be found at the end of the article

Introduction

People frequently fail to grasp the hazards of tobacco use, predominantly cigarette smoking. Over 1.3 billion adults are currently tobacco users with a total global prevalence of 29% of which 47.5% of men and 10.3% of women over the age of 15 years smoke¹. Most people who use tobacco regularly do so because of nicotine's addictive properties, which have been speculatively linked to arousal, mood modulation, performance enhancement, and associated analgesia²⁻⁶. Overcoming addiction is difficult, even though most users express a desire to reduce the use or stop entirely, and may require both pharmacologic and behavioral treatments².

An abundance of studies has demonstrated that even brief, simple advice from health care professionals (HCPs) has a noticeable rise in tobacco cessation rates, putting them on the front lines of tobacco prevention and cessation efforts⁷⁻⁹. HCPs, along with health care professional students (HCS), can serve as role models and help educate the population. Further, at a societal level, they can influence national and global tobacco control policies and efforts¹⁰. Unfortunately, it has been estimated that only one out of every five patients is offered adequate assistance¹¹. This can be primarily attributed to tobacco use in the HCP community, which deters them from giving proper tobacco prevention and cessation guidance¹². In addition, the academic curricula for HCS lack comprehensive training in assisting patients in tobacco cessation techniques¹³. Furthermore, low- and middle-income countries in the regions of Africa and Asia, such as India, have been reported to lack a systemic approach to evidence-based nicotine cessation techniques in their academic framework¹⁴. Even though it is

common practice to include tobacco use when taking the history of a person in clinical rotations, the topics of cessation efforts and guidance are seldom touched upon¹⁵.

The World Health Organization, The Centers for Disease Control and Prevention, and the Canadian Public Health Association developed the Global Health Professions Student Survey (GHPSS)¹⁴, a standardized school-based survey of third-year students pursuing advanced degrees in dentistry, medicine, nursing, or pharmacy. Most of the studies^{10,16-18}, along with the national survey¹⁷, have not done a study assessing all the four disciplines simultaneously. This makes it problematic to estimate the prevalence and determinants of tobacco use in the HCS. The last national GHPSS study in India was done more than a decade ago¹⁸, and since then, there have been a few changes to the medical curricula by the Medical Council of India since the last GHPSS study. Thus, in this study, our objective is to determine the prevalence and determinants of tobacco consumption in third-year students of all the four health care disciplines (medical, dental, pharmacy, and nursing) in Mysore, India, and to assess the extent of their undergraduate education on tobacco control and cessation.

Methodology

Ethics statement

The Institutional Ethics Committee of JSS Medical College, Mysuru approved this study (approval number: JSSMC/IEC/18/7/2018-19). Written informed consent for both participation and publication of data was obtained from all participants by the means of a tick box before beginning the survey. Consent was also obtained from the participants' institutions.

Study population and sampling

The study was conducted among third-year undergraduate health care professional students in Mysore, situated in Karnataka, India from September 2019 to March 2020. The recruitment period, including taking the necessary permissions from institutions, took two months (September 2019 to November 2019) and data collection took place from November 2019 to March 2020. Mysore has a total population of 3,001,127 people, constituting 50.36 % males and 49.63 % females, and an average literacy rate of 72.79 %¹⁹. Institutions for study participants were identified using the State Medical University registry²⁰. The city has 15 institutions, two medical, two dental, three pharmacy, and eight nursing colleges, of which 990 students were studying in their third year of undergraduate training. All 990 students were considered for the study. Unwillingness to participate was the only exclusion criteria.

Data collection and study instruments

To conduct the study, a web-based instrument (Google Forms) was used. It consisted of questions from the GHPSS standardized questionnaire²¹ in English (see *Extended data*). The students were invited to participate via email, which were obtained from the institutions. The email sent to the students explained the objective of the study and guaranteed total anonymity. A hyperlink was attached to the invitation email,

which directed participants to the survey on Google Forms. The survey ran for 40 days, and two reminder emails were mailed at 10 and 20 days. The invite also had the contact information of the principal investigator to answer survey-related queries. To limit the duplication of entries, each invite could only be used once.

The GHPSS²¹ has created a standard test of variables from the core questions to facilitate cross-country comparisons. The questionnaire had 42 core questions to assess the following outcomes: prevalence of tobacco use among health professional students; desire for smoking cessation; exposure to environmental tobacco smoke; attitudes towards tobacco use; training received regarding smoking cessation techniques and basic demographics. The questionnaire can be found as extended data²².

Definitions and measures

Usage of tobacco and different ways of consuming it. Those who had never consumed tobacco were categorized under 'Never-user'; those who had finished any form of tobacco at least once were categorized under 'Ever-user,' and someone who had consumed tobacco in the last 30 days was classified as 'Active user.' Age, sex, and educational qualification were included in socio-demographic data. The questionnaire listed the mode of consumption, whether in the form of smoking or smokeless form.

Knowledge, notions, and attitudes regarding tobacco consumption. Questions related to tobacco use among family and peers of the participants were asked to determine social influences for tobacco use. A positive attitude concerning tobacco use was assessed with questions such as their impression of tobacco users, ease associated in social gatherings with tobacco use, and the health impact of tobacco consumption for a year.

Knowledge, notions, and beliefs associated with tobacco consumption were measured with questions assessing their understanding of the adverse effects of tobacco, quitting difficulties, exposure to information on anti-tobacco through mass media, and discussions regarding smoking and cessation with the family/teachers of the participants.

Data of various GHPSS studies conducted in different fields of healthcare related education i.e Medicine, Dental, Nursing and Pharmacy from various continents were retrieved from the GTSS dataset²³.

Statistical analysis

Data from the online survey forms were exported into Microsoft Excel 2017, and random verification of 10% of data was done for internal validation. Missing data were addressed by using the case deletion approach wherein we omitted the cases with the missing data and analyzed the rest²⁴. was used for calculating the frequencies. For the data of continuous variables, the Shapiro-Wilk test for normality was first conducted. It was found that it was normally distributed. Continuous

variables were represented as mean with standard deviation (SD) and categorical variables as a number with percentage (%). Statistical significance between groups was assessed by Pearson's chi-square test for categorical variables and by one way ANOVA for continuous variables. Binomial univariable and multivariable logistic regression analyses was performed to identify independent variables associated with tobacco use and cessation of tobacco use. Variables presumed to be of clinical importance, such as demographic factors (i.e age, sex, age of initiation of tobacco use etc.) and interpersonal factors (such as having friends or family who use tobacco) were included in the model. All statistical analysis was performed using SPSS v.21 and EpiInfo™ 8.5.1 (2008). A two-tailed $p < 0.05$ was considered statistically significant.

Results

Demographics

In this study, 990 health care professional undergraduates were invited to participate, out of which 838 participated with a response rate of 84.47% (see the underlying data for the full dataset²²). The distribution of the participants who responded was highest in medical students ($n=304$; 36.2%), followed by dental ($n=199$; 23.2%), pharmacy ($n=147$; 17.55%) and nursing ($n=188$; 22.4%). Reluctance to respond was the main reason ($n=84$; 8.5%) for the lack of participation while the remaining were due to incomplete completion of the survey ($n=68$; 6.9%). The mean age of participation was 20.89 ($SD \pm 0.94$) years. (Table 1).

Age of initiation and prevalence

The age of initiation (AOI) was analyzed to be 18.18 ± 3.01 years on average. The most common AOI of tobacco use was around the age of 18 for all the groups except those in dentistry who were found to have an AOI of approx. 17 years (Table 1 and Figure 1a). On comparing the age if initiation in tobacco "ever users" across the GHPSS studies conducted in India from 2005 till 2019, we found that the study in 2005 observed the largest percentage of 11 to 15 year old (27.4% and 23.9%). The percentage of the study population whose age of initiation was "20 years or older" saw an upward trend from just less than 15% in 2005 to 37% in 2009; whereas, the percentage of the study population whose age of initiation was 16 – 17 years, saw a downtrend from 33% in 2005 to 15% in 2009 (Figure 1b)

In terms of prevalence of tobacco use, 243 (28.9%) reported having used tobacco at least once in their lifetime. The most preferred destinations (32.9%) for tobacco use were places like tea stalls and bars, whereas the least preferred were at the school. The prevalence of active tobacco consumption was highest among medical students (20.1%) and least among nursing students (12.7%) (Table 1). Upon comparison of GHPSS data globally, it was found that Europe had the highest proportion of tobacco users across all healthcare professions (Pharmacy: 62.1%; Nursing: 69.2%; Medical: 72.5% and Dental: 77.8%) followed by Region Of the Americas (Pharmacy: 62.1%; Nursing: 63.8%; Medical: 62.9% and Dental: 65.6%). India in 2005 recorded the lowest proportion of

Table 1. Detailed prevalence and socio-demographic factors of the study population consisting of 3rd year students from health care fields using the Global Health Professions Student Survey (GHPSS) questionnaire in the city of Mysore, India in the year 2019–20 (N= 838).

	Medicine (N=304)	Dentistry (N=199)	Pharmacy (N=147)	Nursing (N=188)	Test Statistic
Age	21.07± 0.72	20.59± 1.05	21.28± 0.82	20.45± 1.06	F = 0.65; p=0.662
Age of initiation of tobacco use	18.29± 3.15	17.09± 2.88	18.11± 3.17	18.16± 2.84	F = 0.26; p=0.817
Tobacco use status					
Never-user ¹	217(71.3%)	125(62.8%)	105(71.4%)	148(78.7%)	χ^2 (3)= 20.35; p=0.002
Ever-user ²	87 (28.6%)	74(37.1%)	42(28.5%)	40(21.2%)	
Active ³	61(20.1%)	54(27.14%)	28(19.1%)	24(12.7%)	
Sex distribution					
Female	173 (56.9%)	68(34.1%)	98(66.7%)	152(80.8%)	χ^2 (3)= 94.28; p<0.001
Male	131(43.1%)	134(65.8%)	49(33.3%)	36(19.2%)	
Place of tobacco use for ever-users (N=243)					
At home	15(17.2%)	11(14.8%)	7(16.6%)	12(30.1%)	χ^2 (3)= 3.19; p= 0.202
At school	2(2.3%)	4(5.4%)	0(0%)	0(0%)	
At friends' place	20(22.9%)	14(18.9%)	7(16.6%)	12(30.1%)	
At social events	7(8.1%)	9(12.1%)	0(0%)	4(10.2%)	
At public places	7(8.5%)	11(14.8%)	21(50.1%)	0(0%)	
Others (e.g. Tea stalls)	36(41.1%)	25(33.7%)	7(16.5%)	11(29.9%)	
Frequency and quantity of usage of smoking forms of tobacco among ever-users (N=243)					
Not used tobacco in the past 30 days	217(71.3%)	125(62.8%)	105(71.4%)	148(78.7%)	χ^2 (3)=2.137; p= 0.343
<1 cigarette per day	62(20.3%)	45(22.6%)	24(18.9%)	28(14.8%)	
1 cigarette per day	16(5.2%)	18(9.1%)	14(8.2%)	12(6.3%)	
2 to 5 cigarette per day	2(0.6%)	4(2.1%)	4(1.5%)	0(0%)	
6 to 10 cigarette per day	1(0.3%)	2(1.1%)	0(0%)	0(0%)	
11 to 20 cigarette per day	1(0.3%)	1(0.5%)	0(0%)	0(0%)	
During the past 7 days, on how many days have people smoked in your presence?					
0	99(32.57%)	37(18.59%)	70(47.62%)	84(44.68%)	χ^2 (3) = 76.123; p <0.001
1 to 2	105(34.54%)	60(30.15%)	21(14.29%)	56(29.79%)	
3 to 4	56(18.42%)	49(24.62%)	35(23.81%)	20(10.64%)	
5 to 6	17(5.59%)	21(10.55%)	7(4.76%)	20(10.64%)	
More than 7	27(8.88%)	32(16.08%)	14(9.52%)	8(4.26%)	
Do your parents (or step-parents/guardians who stay at your home) use tobacco?					
Yes	267(87.83%)	177(88.94%)	126(85.71%)	160(85.11%)	χ^2 (3) = 1.663; p = 0.644
No	37(12.17%)	22(11.06%)	21(14.29%)	28(14.89%)	
Do any of your peers use tobacco?					
None of them	73(24.01%)	23(11.56%)	63(42.86%)	40(21.28%)	χ^2 (3) = 72.826; p < 0.001
Some of them	178(58.55%)	121(60.80%)	39(26.53%)	112(59.57%)	
Most of them	46(15.13%)	49(24.62%)	42(28.57%)	31(16.49%)	
All of them	7(2.30%)	6(3.02%)	3(2.04%)	5(2.66%)	
Cessation methods used in those who quit tobacco use (N=76)					
Combination Therapy (Behavioral+ Pharmacological)	3 (11.5%)	2 (10.0%)	1 (7.1%)	1 (6.2%)	χ^2 (3)= 1.063; p = 0.999
Pharmacological Only	4 (15.5%)	4 (20.0%)	2 (14.3%)	2 (12.6%)	
Behavioral therapy only	2 (7.6%)	1 (5.0%)	1 (7.1%)	1 (6.2%)	
Unassisted	17 (65.4%)	13 (65.0%)	10 (71.5%)	12 (75.0%)	

Note: ¹A "never user" was defined as one who had never used tobacco; ²An "ever user" was someone who had used any form of tobacco at least once; ³An "active user" was someone who used tobacco within the last 30 days

Figure 1. Figure 1a: Comparison of “age of initiation” of tobacco use in “ever-users” among students from health care fields using the GHPSS questionnaire in the city of Mysore, India in the year 2019 using the GHPSS questionnaire in the city of Mysore, India in the year 2019-20 (N=243). Figure 1b: Comparison of age of initiation of tobacco use in our study and different GHPSS studies done in India since 2005 (GTSS Dataset)²³.

tobacco usage across all healthcare disciplines followed by South East Asia for pharmacy (India: 24.2%; SEA: 30.2%) and dental (India: 11.3%; SEA: 31.3%), Africa for nursing (34.4%) and western pacific for medical (34.8%) students indulging in tobacco use (Figure 2).

Exposure to secondhand smoke

Almost 30% of students reported that they had been exposed to secondhand smoking (SHS) in the past seven days; Medical and dental students were more exposed to SHS than the other two groups with only 32.5% of medical and 18.6% of dental students having no exposure to SHS (Table 1). Furthermore, most of the students (95.34%) stated that their school had an official policy banning smoking in school buildings and clinics. While (37.94%) of the students reported that the policy was enforced. Of the students surveyed, more than 90% of them thought that tobacco sales to adolescents should be banned and that there should be a complete ban on the advertisement of tobacco products. Further, nearly two-thirds (64.56%) agreed that smoking should be banned in all enclosed spaces without exceptions (Table 2).

Nicotine cessation

The majority of the students smoked less than one cigarette per day, the number of students who smoked more than one cigarette per day was less than 3%. More than a third of the students reported that they wanted to quit (37.72, %). A significant number of medical students (55.74%), when compared to other HCS, had tried quitting in the past (Table 3). Nearly half of dental students (46.3%), and one-third

of medical students (31.15%) desired to discontinue tobacco use. Only 7 of the 76 student who successfully quit tobacco consumption used combination therapy (Behavioral+ Pharmacological) while 68.4% did so without any assistance (Table 1).

Curriculum and formal training

A majority (91.17%) of the students thought health professionals have a role in advising smoking cessation to patients. Interestingly, 94.3% of medical students and 77.7% of dental, pharmacy, and nursing students were taught about the danger of tobacco smoking in their classes. The majority of the medical students (88.70%) reported that they knew the importance of recording tobacco use history while taking a patient's history. Only (33.7%) of nursing students had been educated about how to elicit a smoking history from the patients. The number of students who received formal training in smoking cessation approaches was 24.8% for medical, 8.2% for dental, 14.6% for pharmacy, and 6.3% for nursing. Two-thirds of medical students, compared to 38.9% of dental, 29.7% of pharmacy, and 11.40 % of nursing students, learnt “the reasons why people smoke” as a part of their formal training. However, only less than a quarter of them were aware of the role of antidepressants in nicotine cessation medications (23.87%), with the highest understanding among medical students (39.10%) and least among nursing students (9.80%) (Table 4).

Results from multivariable analysis

We did both univariable and multivariable analysis which included active tobacco use as the outcome variable. Multivariable

Figure 2. The chart is a summation of all the GHPSS data collected from different parts of the world (including the present study), starting from the year 2000. This consisting of Students from Healthcare field (HCS) comprising of all the students studying medicine (MBBS), dental sciences (BDS), Pharmacy (B.Pharm/Pharma D) or Nursing (ANM/GNM) (GTSS Dataset)²³.

Table 2. Knowledge, beliefs and Attitude towards tobacco consumption among students from health care fields using the Global Health Professions Student Survey (GHPSS) questionnaire in the city of Mysore, India in the year 2019–20 (N= 838).

	Medicine (N=304)	Dentistry (N=199)	Pharmacy (N=147)	Nursing (N=188)	Test statistic
Should tobacco sales to adolescents (persons younger than 18 years old) be banned					
Yes	267(87.83%)	182(91.46%)	134(91.16%)	173(92.02%)	$\chi^2(3) = 3.15$; $p = 0.368$
No	37(12.17%)	17(8.54%)	13(8.84%)	15(7.98%)	
Should there be a complete ban of the advertising of tobacco products					
Yes	262(86.18%)	196(98.49%)	133(90.48%)	179(95.21%)	$\chi^2(3) = 28.08$; $p < 0.001$
No	42(13.82%)	3(1.51%)	14(9.52%)	9(4.79%)	
Are you in favour of banning smoking in enclosed public places (such as in restaurants, bus, schools)					
Yes, in all enclosed places without exceptions	187(61.51%)	110(55.28%)	112(76.19%)	132(70.21%)	$\chi^2(3) = 44.10$; $p < 0.001$
Yes, but allowing for designated areas for smokers	106(34.87%)	84(42.21%)	21(14.29%)	52(27.66%)	
No	11(3.62%)	5(2.51%)	14(9.52%)	4(2.13%)	

	Medicine (N=304)	Dentistry (N=199)	Pharmacy (N=147)	Nursing (N=188)	Test statistic
Should health professionals get specific training on cessation techniques					
Yes	295(97.04%)	175(87.94%)	139(94.56%)	161(85.64%)	$\chi^2(3) = 23.93$; $p < 0.001$
No	9(2.96%)	24(12.06%)	8(5.44%)	27(14.36%)	
Should health professionals routinely advise their patients who use tobacco products to quit using these products					
Yes	273(89.80%)	189(94.97%)	145(98.64%)	181(96.28%)	$\chi^2(3) = 17.25$; $p < 0.001$
No	31(10.20%)	10(5.03%)	2(1.36%)	7(3.72%)	
Are a patient's chances of quitting smoking increased if a health professional advises him or her to quit					
Yes	269(88.49%)	182(91.46%)	141(95.92%)	174(92.55%)	$\chi^2(3) = 7.42$; $p = 0.059$
No	35(11.51%)	17(8.54%)	6(4.08%)	14(7.45%)	
Are health professionals who smoke less likely to advise patients to stop smoking					
Yes	253(83.22%)	167(83.92%)	124(84.35%)	161(85.64%)	$\chi^2(3) = 7.42$; $p = 0.059$
No	51(16.78%)	32(16.08%)	23(15.65%)	27(14.36%)	
Does your school have an official policy banning smoking in school buildings and clinics					
Yes	289(95.07%)	192(96.48%)	139(94.56%)	179(95.21%)	$\chi^2(3) = 0.84$; $p = 0.83$
No	15(4.93%)	7(3.52%)	8(5.44%)	9(4.79%)	
Is your school's official smoking ban for school buildings and clinics enforced					
Yes	133(43.7%)	79(39.6%)	42(28.4%)	64(34.7%)	$\chi^2(3) = 11.18$; $p = 0.010$
No	171(56.3%)	120(71.6%)	105(71.6%)	123(65.3%)	

Table 3. Relationship between cessation of tobacco consumption among active users¹ from the study population consisting of 3rd year students from health care fields using the GHPSS questionnaire in the city of Mysore, India in the year 2019-20 (N= 167).

	Medicine	Dentistry	Pharmacy	Nursing	Total	Test statistic
	(N=61)	(N=54)	(N=28)	(N=24)	(N=167)	
Opinion on ability to stop tobacco consumption						
Can stop if needed	31(50.82%)	38(70.37%)	19(67.86%)	16(66.7%)	104(62.28%)	$\chi^2(3) = 6.414$; p= 0.093
Cannot stop if needed	30(49.18%)	16(29.63%)	7(32.14%)	8(33.34%)	63(36.53%)	
Opinion on stopping tobacco consumption						
Don't want to stop	42(68.85%)	29(53.7%)	21(78.57%)	12(50.00%)	104(62.28%)	$\chi^2(3) = 6.281$; p = 0.098
Would like to stop	19(31.15%)	25(46.3%)	7(21.43%)	12(50.0%)	63(37.72%)	
History of stopping tobacco consumption in the past one year						
Yes	34(55.74%)	17(31.48%)	12(42.86%)	11(45.8%)	74(44.31%)	$\chi^2(3) = 6.876$; p = 0.075
No	27(44.26%)	37(68.52%)	16(57.14%)	13(54.2%)	93(55.69%)	

¹An "active user" was someone who used any form of tobacco within the last 30 days

Table 4. Curriculum/Training among students from health care fields using the Global Health Professions Student Survey (GHPSS) questionnaire in the city of Mysore, India in the year 2019–20 (N= 838).

	Medicine (N=304)	Dentistry (N=199)	Pharmacy (N=147)	Nursing (N=188)	Test Statistic
During your (medical, dental, nursing, or pharmacy) school training, were you taught in any of your classes about the dangers of smoking					
Yes	287 (94.30%)	147(73.80%)	121(82.40%)	147(78.20%)	$\chi^2(3)= 44.18$; $p<0.001$
No	17(5.7%)	52(26.2%)	26(17.6%)	41(21.80%)	
During your (medical, dental, nursing, or pharmacy) school training, did you discuss in any of your classes the reasons why people smoke					
Yes	206(67.90%)	77(38.90%)	44(29.70%)	21(11.40%)	$\chi^2(3)= 7.42$; $p=0.059$
No	98(32.10%)	122(61.10%)	103(70.30%)	167(88.60%)	
During your (medical, dental, nursing, or pharmacy) school training, did you learn that it is important to record tobacco use history as part of a patient's general medical history					
Yes	270(88.70%)	137(68.70%)	80(54.70%)	63(33.70%)	$\chi^2(3)= 66$; $p<0.001$
No	34(11.3%)	62(31.3%)	67(45.3%)	125(66.3%)	
During your (medical, dental, nursing, or pharmacy) school training, have you ever received any formal training in smoking cessation approaches to use with patients?					
Yes	75(24.80%)	16(8.20%)	21(14.60%)	12(6.30%)	$\chi^2(3)= 41.30$; $p<0.001$
No	229(75.20%)	183(91.8%)	126(85.4%)	176(93.7%)	
Have you ever heard of using antidepressants in tobacco cessation programs (such as bupropion or Zyban)					
Yes	119(39.10%)	25(12.70%)	38(26.10%)	18(9.80%)	$\chi^2(3)= 91.11$; $p<0.001$
No	185(60.9%)	174(87.3%)	109(73.9%)	170(90.20%)	

analysis showed us that age [OR (95%CI):1.86 (1.13-3.06)], sex [OR (95%CI):2.09 (1.55-2.84)], Peer tobacco use [OR (95%CI): 4.98 (2.89-8.60)], family tobacco use [OR (95%CI): 1.85 (1.61-2.13)] and poor knowledge regarding hazards of tobacco use [OR (95%CI): 2.65 (2.27-3.06)] were all found to be independent risk factors of active tobacco use (Table 5). Analysis of every user who quit tobacco use and the methods they used to quit showed that combined behavioral and pharmacological therapy had the highest impact for cessation [OR (95%CI): 3.92 (3.58-4.30)] (Table 6).

Discussion

According to the World Health Organization (WHO), the tobacco epidemic is one of the biggest public health threats claiming 5.4 million lives worldwide each year²⁵. The Global Burden of Diseases, Injuries, and Risk Factors Study 2015 (GBD 2015) stated that India has the 2nd largest population indulging in tobacco use with China in the first place²⁶. Reducing the damage done by this epidemic fall in the hands of the HCPs and HCS. At an individual level, health professionals

can help educate the population. Moreover, at a societal level, health care professionals can support anti-smoking policies that influence national and global tobacco control efforts²⁷.

Our study found a 28.9% ever-use prevalence which was similar to the national average for the overall population (28.6%) and higher than the state average (22.8%)²⁸. It was also higher than the GHPSS national survey of India (23.5%)²⁹. GHPSS studies from other regions of the world showed varying prevalence ranging from 71.6% in eastern European countries to 31.1% in southeast Asian regions²¹. Concerning differences in disciplines, medical students (28.6%) and dental students (37.1%) were more indulgent in tobacco use. Similar results were seen in other GHPSS studies worldwide (Figure 2).

Furthermore, our study also revealed that most of the participants started to use tobacco only after 18 and above (Figure 1a). Similar trends have been observed in different GHPSS studies in India since 2005, where we have seen a

Table 5. Univariable and Multivariable Binomial Logistic regression analysing odds of active tobacco consumption among students in the city of Mysore, India in the year 2019–20 (N= 838).

	Univariable analysis [Odds ratio (95% CI)]	Multivariable analysis [Odds ratio (95% CI)]
Age of participant	1.81 (1.62-2.01)	1.86 (1.13-3.06)
Sex (ref: Male)	2.18 (1.73-2.76)	2.09 (1.55-2.84)
Age of Initiation	0.86 (0.74-0.99)	0.93 (0.45-1.86)
<i>Tobacco use amongst friends</i>		
No peer tobacco use	Ref	Ref
One or more peer tobacco use	5.73 (3.46-9.50)	4.98 (2.89-8.60)
<i>Tobacco use amongst family members</i>		
No family tobacco use	Ref	Ref
One or more family tobacco use	2.01 (1.72-2.36)	1.85 (1.61-2.13)
<i>Knowledge regarding hazards of tobacco use</i>		
Adequate knowledge	Ref	Ref
Poor knowledge	3.92 (3.58-4.30)	2.65 (2.27-3.06)
<i>People using tobacco in your presence in last 5 days</i>		
None	Ref	Ref
Occasionally (1 to 2)	1.12 (1.05-1.20)	1.42 (1.08-1.88)
Regularly (3 to 6)	2.58 (1.50-4.45)	2.92 (2.54-3.37)
<i>Type of medical education obtained</i>		
Medicine	Ref	Ref
Dentistry	1.53 (0.83-2.79)	1.69 (0.82-3.48)
Pharmacy	1.98 (0.46-8.55)	1.10 (0.27-4.49)
Nursing	1.71 (0.93-3.18)	1.22 (0.58-2.54)

Table 6. Univariable and Multivariable Binomial Logistic regression analysing odds of tobacco cessation among students in the city of Mysore, India in the year 2019–20 (N= 838).

	Unadjusted Odds Ratio	Adjusted Odds ratio**
Unassisted	Ref	Ref
Combination Therapy (Behavioral+ Pharmacological)	4.34 (3.94-4.76)	3.92 (3.58-4.30)
Pharmacological Only	1.40 (1.23-1.68)	1.59 (1.23-2.64)
Behavioral therapy only	1.09 (1.04-1.15)	1.94 (1.03-3.67)

**This analysis has been adjusted for age, sex and type of health education received (i.e medicine (MBBS), dental sciences (BDS), Pharmacy (B.Pharm/Pharma D) or Nursing (ANM/GNM)).

steady decrease in AOI from younger age groups and an increase in AOI of older age groups (Figure 1b).

Slightly more than a third of the study population (37.72%) were willing to give up smoking. Out of which (44.31%) have tried quitting in the past and failed while less than one percent of the study population took professional help in quitting. This data sheds light on a vital wasted opportunity to decrease the prevalence of smoking in HCS. Additionally, our study distinctly pointed out that an intention to quit, along with professional (behavioral) and pharmacological help, increased the likelihood of the participant quitting by 4 to 6 times. The eagerness to quit is higher globally, ranging from 62.5% in Eastern Mediterranean regions to 82.9% in African regions²¹. A well-tailored tobacco cessation program along with evidence-based medicine can have a significant impact on this population. This would help those who are willing to quit taking that step to halt their tobacco use for good.

It should be made a priority for our policymakers to help HCS quit tobacco use as it not only helps the general health and well-being of the student³⁰ but also influences them in delivering effective anti-tobacco counseling when they start seeing patients³¹. A brief interaction between the doctor and the patient regarding quitting tobacco can have a substantial positive outcome³². Unfortunately, it has been observed that in developing countries like India, the HCPs very rarely take the time to discuss tobacco cessation³³.

Exposure to SHS is detrimental to an individual's health and can cause numerous diseases³⁴. Our study showed that a high proportion of students (65.4%) were exposed to SHS. These numbers are not far off from the national GHPSS (73%)³⁵. SHS exposure in GHPSS studies varied between 80.11% in European regions and 56.3% in African regions, indicating global variation²¹. The wide range is likely due to the socio-cultural norms of smoking in different areas of the world. Exposure to SHS, especially in the universities, could be significantly cut down by having a clear anti-tobacco policy that ensures better air quality and encourages those who use tobacco to quit.

Additionally, such policies also assist in sending a strong message to doctors, students, and patients concerning the perils of tobacco use³⁶. In our study, even though (95.34%) agreed to have a clear anti-tobacco policy in their universities, only (37.94%) said that the universities were enforcing it. Suitable measures should be taken to bridge the gap between making policies and implementing them.

To see any significant changes in the reduction of the disease burden of tobacco use, there is a need for health care professionals to be adequately trained in all aspects of tobacco prevention and cessation. Results from our study showed that over (91.4%) acknowledged that they would soon be seen as "role models" by the rest of the society, which was identical to other international GHPSS studies³⁷. Alarming, only

one-sixth overall (16.8%) [highest in medical 24.8% and lowest in nursing 6.30 %] received any sort of formal training on tobacco cessation therapies. This was lesser than the national GHPSS findings of 29.81%³⁵. Likewise, we can see very little difference in the global data concerning having received any formal training ranging from 26.3% in the Eastern Mediterranean region to 21.9% in the Region of Americas²¹. Policymakers must make substantial changes in the curricula of the HCS by adding modules specific to tobacco control and cessation or at least incorporate the required information into the preexisting curricula³⁸.

The fight against the epidemic of tobacco has been very challenging. Results from our current study are problematic as it shows no significant reduction from the 10-year-old national GHPSS study³⁵. Furthermore, our research, similar to international GHPSS studies conducted previously²¹, continues to reveal the daunting lack of preparation of HCS for their responsibility as HCPs in tobacco prevention and cessation. Countries with a higher income have been shown to have already included key concepts of tobacco cessation into the curricula of HCS³³. Moreover, there have been many studies focusing on improving the tobacco cessation education of the HCS^{18,39,40}. Disappointingly, there is a paucity of data regarding the efficacy of the present anti-tobacco training protocols used in low- and middle-income countries like India^{17,41}. An essential step in achieving a reduced prevalence of tobacco use in our country would be by conducting adequate research into more effective tobacco cessation techniques, making better tobacco control policies, and revising the curricula of HCS with updated tobacco cessation strategies to help them in their practice in the future.

Strengths and limitations of the study

The questionnaire was administered anonymously online, so participants would be less apprehensive about being truthful. The study used a standardized GHPSS questionnaire which makes the data comparable with data collected from the rest of the world using the same method. All four disciplines of HCS were considered in the study with adequate sample size. Tobacco use was self-reported without any biochemical verification. It is subject to recall bias. This study was carried out in one city and cannot be generalized to a diverse country like India.

Conclusion

Tobacco use in this study was considerably lesser than in European countries, the Region of the Americas, and the Eastern Mediterranean countries and was similar to the national GHPSS (2009) study²³. Dental students had the highest prevalence of the four, while nursing students had the lowest. The study results and previous GHPSS studies indicate a need to design better tobacco control policies that can help us tackle the increasing trend in the prevalence of tobacco use in HCS. Furthermore, it also demonstrates a need for an updated curriculum for tobacco cessation strategies and more research

into better cessation strategies. Successful implementation of these two steps will give us a better chance at attenuating the tobacco epidemic.

Data availability

Underlying data

Open Science Framework: The extent of formal tobacco cessation training received by student health professionals and the prevalence of tobacco use among them.

<https://doi.org/10.17605/OSF.IO/N8WFM>²².

This project contains the following underlying data:

- GHPSS OSF_Original_Raw Data.xlsx (survey responses).

- GHPSS_OSF_Global_GHPSS Dataset.xlsx (compiled global GHPSS data from CDC datasets).

Extended data

Open Science Framework: The extent of formal tobacco cessation training received by student health professionals and the prevalence of tobacco use among them.

<https://doi.org/10.17605/OSF.IO/N8WFM>²².

This project contains the following extended data:

- Global Health Professions Student Survey (GHPSS) Questionnaire.pdf (survey instrument).

Data are available under the terms of the [Creative Commons-ShareAlike 4.0 International](#) (CC-BY 4.0).

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Open Peer Review

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Omara Dogar

Department of Health Sciences, University of York, York, UK

This is a cross-sectional study eliciting prevalence and training on tobacco cessation in healthcare professional students in Mysore, India. The study adds value to understanding the current status of tobacco use and awareness of providing cessation support to clients/patients in this group in LMICs. The way the data is presented can be improved, my comments below are designed to bring clarity to such aspects of the study and I hope these are useful.

Title:

- Please consider adding study location in the title: "The extent of formal tobacco cessation training received by student health professionals and the prevalence of tobacco use among them **in India**: a cross-sectional study"

Abstract (methods):

- Is the [20.89 (SD± 0.94) years] the mean age of the students completing the survey? This needs to be clear and should be moved to the results. Also move the response rate and n=838 (which I am assuming is the number completing the survey) to the results.

Methodology:

- Please consider changing 'methodology' to 'methods'. I would use methodology only when a certain framework approach or other such methodology is being applied to the way data is collected or analysed, which is not the case here.
- **(Data collection and study instruments, line 2):** Please can the 'extended data' be cross-referenced as supplementary data for a more universally understood term? Please also check the links for the extended data (<https://doi.org/10.17605/OSF.IO/N8WFM22>) and underlying data (<https://doi.org/10.17605/OSF.IO/N8WFM>) as there are no data on the given OSF website.
- In the paragraph 2, please add how long it took the students (or was expected to take them), on average, to complete the survey.

- **(Statistical analysis):** Please explain why missing data cases were deleted instead of using data imputation techniques. Please comment on any loss of statistical power by dropping cases and whether the values were missing at random and that you were not inadvertently removing a group of participants. The last comment might be better elaborated in the discussion section.

Results:

- **(Table 1, and Age of initiation):** Please add the sample of students for whom age of initiation of tobacco use was recorded. I reckon it would not apply to never users.
- **(Figure 1b):** This comparison of age of initiation of tobacco use in the current study and different GHPSS studies done in India since 2005, was not mentioned in the methods. Please add this in the methods and describe how the comparison was undertaken, which tests were used if any. Also describe these other datasets briefly for the readers to understand any differences/similarities in the sample characteristics.
- **(Figure 2):** Same comment as above. Add a brief description of these datasets in methods. In the figure, please add the year for each survey when it was conducted.
- **(Table 6):** "Univariable and Multivariable Binomial Logistic regression analysing odds of tobacco cessation among students in the city of Mysore, India in the year 2019–20 (N= 838)". This table caption mentions a sample of 838, which could be misleading because there are only a very few observations for categories of pharmacological, behavioural or combined therapy. Please mention the sample size included for this analysis only. Please also justify how multivariable regression was run on such few numbers. My suggestion would be to drop this analysis and just report the data descriptively because regression on such few numbers in each cell would not give accurate stats.

Discussion:

- **(Strengths and limitations):** Please discuss the limitations of using cross-sectional data for studying associations and how the data should be interpreted in this context. Please also discuss the missing values that were dropped from the data set and its impact on the outcomes.

Conclusion:

- Please align the study conclusion with the data that is presented. A few statements, e.g. "The study results and previous GHPSS studies indicate a need to design better tobacco control policies that can help us tackle the increasing trend in the prevalence of tobacco use in HCS." This is an over extension of the data, you can discuss this point in more detail above in the discussion section and mention policies that would benefit in HCS to reduce their tobacco use or improve their curriculum on the topic. However, please keep the conclusion to the point from what the data shows and what is within the scope of this cross-sectional study.

Some minor edits and typos, that need correcting:

- **(Introduction, last paragraph – line 6):** Delete 'since the last GHPSS study' from "The last national GHPSS study in India was done more than a decade ago, and since then, there

have been a few changes to the medical curricula by the Medical Council of India since the last GHPSS study.”

- **(Ethics statement):** spell out JSS Medical College at first use of abbreviation.
- **(Statistical analysis, line 3):** “was used for calculating the frequencies.” Seems to be missing the rest of the sentence.

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Partly

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

No

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Tobacco control; tobacco cessation intervention studies and clinical trials; Behavioural tobacco treatments

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.