



# Perceived Risk of Tobacco Use in COVID-19 Disease Causation and Severity among Healthcare Professionals: A Pan India Online Survey

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## ABSTRACT

**Background:** Risk perception for a disease significantly influence practice related to it. The study examined the perceived risk of tobacco use in COVID-19 disease causation and severity among healthcare professionals (HCPs) of India.

**Methods:** We carried out this explorative cross-sectional online survey among 687 HCPs across India during December 2020 using a self-administered, structured 'google form' (an online data collection tool). The data were analysed using Statistical Package for Social Sciences (SPSS).

**Results:** Educational stream (Dental) [adjusted odds ratio (AOR): 3.25] [Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH)] [AOR: 3.00], marital status (currently married and staying with spouse) [AOR: 0.43], perception of tobacco form that increases risk (only smoking) [AOR: 11.64] (both smoking and smokeless) [AOR: 22.25] and current tobacco user [AOR: 1.59] were significant multivariable attributes of perception of tobacco use as risk factor for COVID-19 disease causation (63.0%). Marital status (currently married and staying with spouse) [AOR: 0.50 and perception of tobacco form that increases risk (only smoking) [AOR: 12.93] (both smoking and smokeless) [AOR: 27.78] were identified as independent multivariable attributes of perceived risk for COVID-19 disease severity (77.9%). Perceived risk of tobacco use in COVID-19 disease causation and severity were significantly associated with their tobacco cessation advice-giving behaviour to patients (73.9%) and family members (66.7%).

**Conclusion:** Three in every five HCPs perceived that tobacco increases risk of COVID-19. Sensitization workshops on several aspects of tobacco control need to be organized for HCPs.

**Key words:** COVID-19; Health Personnel; Tobacco; Risk; Perception

## INTRODUCTION

Tobacco is an established risk factor for many communicable (i.e., tuberculosis, pneumonia etc.) and non-communicable diseases (i.e., lung cancer, chronic obstructive pulmonary disease etc.). Indi-

viduals suffering from these diseases are highly susceptible for SARS CoV-2 infection and severe form of COVID-19.<sup>1-5</sup> There is insufficient evidence to suggest direct role of tobacco in COVID-19 causation and severity. In fact, "Nicotine Hypothesis" suggests protective role of tobacco against SARS CoV-2 infection.<sup>6</sup>

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World Health Organisation (WHO) and other leading tobacco experts advocated for discouragement of tobacco use during the pandemic as it lowers the immunity and deteriorates the lung health making an individual vulnerable to SARS CoV-2.<sup>7,8</sup> Existing evidences suggests that smoking is associated with increased severity of disease and death in hospitalized COVID-19 patients. However, there is lack of evidence to quantify the risk posed by smoking among hospitalized COVID-19 patients. Unregulated spitting by smokeless tobacco users may be attributed as one of the causes of COVID-19 spread. Thus, tobacco use control may be vital attribute for regulation of this COVID-19 pandemic.<sup>7-10</sup>

Health belief model emphasizes on perceived risk as a major determinant in disease control, prevention and promotion of health.<sup>11</sup> Tobacco risk perception may be termed as thoughts and feeling associated with tobacco use.<sup>12,13</sup> Health care professionals (HCPs) are in a unique position to influence the tobacco related behaviours among general population. They can set an example for general population by refraining themselves from tobacco use. Moreover, they can percolate awareness on adverse effects of tobacco among general population through their patients. The WHO framework convention on tobacco control (WHO-FCTC) article 14 also advocated for active role of HCPs in tobacco control.<sup>14</sup>

India is largely affected by this COVID-19 pandemic with over ten million reported cases and one-fifty thousand reported deaths. The country is currently in second and third position in terms of total reported cases and deaths respectively.<sup>15</sup> The prevalence of adult tobacco use in India is reported to be 28.6%.<sup>16</sup> The country is second largest producer and consumer of tobacco products in the world with about 1,280,000 annual and 3500 daily deaths reported to be associated with tobacco use.<sup>17,18</sup> There is paucity of literature on tobacco use among Indian HCPs. In a study from South India, far more doctors (6.9%) than nurse (<1%) were reported to be tobacco users.<sup>19</sup> Though most of the HCPs report to elicit tobacco use behaviour from their patients, majority of the HCPs do not encourage tobacco users to quit tobacco use.<sup>20</sup> HCPs who themselves use tobacco products were less likely advice tobacco user to quit.<sup>21</sup>

Despite extensive review, we could not find any published literature on risk perception for tobacco use in COVID-19 disease causation and severity among HCPs. Elicitation of perception of tobacco as a risk factor of COVID-19 among HCPs may be vital in terms of control of both COVID-19 pandemic and tobacco use. Thus, the current study was planned to explore perceived risk of tobacco use in COVID-19 disease causation and severity and their attributes among HCPs of India. Additionally, the study also elucidated relationship between risk perception for COVID-19 due to tobacco use and tobacco cessation advice offered by HCPs.

## METHODS

**Design and Sample:** We adopted an explorative cross-sectional design and conducted this study in a pan-India online mode during December 2020. The study population included all the HCPs irrespective of working in public or a private health sector. The HCP holding a graduate degree or above in modern or traditional medicine were eligible for participation. According to Global Adult Tobacco Survey - 2, about 49% of adult smokers and 32% of adult smokeless tobacco users are advised by HCP to quit tobacco use.<sup>16</sup> Assuming that at least 50% of the HCP would have advised quitting of tobacco use during this pandemic, the minimum sample size was calculated to be 384 (using OpenEpi software at 5% absolute precision). A total of 687 HCPs participated in this study. The study has been approved by Institutional Ethics Committee (IEC). Digital informed consent of all the study participants was obtained through google form. The study was conducted abiding by all the principles of declaration of Helsinki.

**Measures:** The study tool included a pre-tested structured questionnaire in the form of "Google Form". The "Google Form" was pre-tested among 30 HCPs who were not included in the final sample. Final version of the study tool was prepared after making necessary modifications based on the feedback. The final tool contained the following sections: Section 1: Study description and digital informed consent; Section 2: Background characteristics; Section 3: Perceived risk and behaviour related to tobacco use in infection causation and severity. Section 2 contained following variables: age in completed years; sex (male, female, transgender); occupation (doctor, nurse); present residing state or union territory; last attained academic degree [Bachelor of Medicine and Bachelor of Surgery (M.B.B.S), modern medicine (Doctor of Medicine (MD)/ Master of Surgery (MS)/ Doctorate of Medicine (DM)/ Master of Chirurgiae (MCh)/ Diplomate of National Board (DNB) specialty/ DNB super-specialty), Bachelor of Science (BSc) Nursing; Master of Science (MSc) Nursing, Bachelor of Dental Surgery (BDS), Master of Dental Surgery (MDS), Bachelor of Ayurvedic Medicine and Surgery (BAMS), Bachelor of Homeopathic Medicine and Surgery (BHMS), Bachelor of Unani Medicine and Surgery (BUMS), Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH) postgraduate]; marital status (currently married and staying with partner, currently married but not staying with partner, currently unmarried, divorced, separated); vulnerable population at home (children <10 years old, elderly ≥60 years old, persons with chronic disease (i.e. hypertension, diabetes), not applicable); ever came in unprotected contact of a COVID-19 suspect or case (yes, no); ever being diagnosed with COVID-19 by antigen tests (yes, no). In section 3 following variables were elucidated: ever tobacco user (yes, no); current tobacco user (yes, no); daily tobacco user (yes, no); perceived form of tobacco that increases risk of COVID-19 (only smok-

ing, only smokeless, both smoking and smokeless, none); perceived risk of tobacco uses in COVID-19 disease causation (yes, no) and severity (yes, no); did ever advise tobacco cessation to patients (yes, no) and family members (yes, no).

The study tool was circulated among the HCPs using social media platform (WhatsApp, Facebook, and Linked In). In addition, E-Mail invitations attaching the study tool was sent to known contacts to participate and they were requested to forward the invitation further to their contacts. The participation was purely voluntary and without any sort of incentives. To prevent multiple submission email id of each study participant was collected. After completion of data collection at 31<sup>st</sup> December, 2020, email id column of the data sheet was scanned using Statistical Package for Social Sciences (SPSS) to identify duplicate entries. There were no duplicate entries found in the study data sheet.

**Analytic Strategy:** The information collected in the google forms was downloaded in Microsoft excel sheet and analysed using SPSS (Version 22) (Chicago, USA). The categorical variables and continuous variables were expressed as proportion (percentage) and mean (SD) respectively. Univariate analysis using chi-square test and logistic regression were performed to identify the potential independent attributes of perceived risk of tobacco use in COVID-19 disease causation and severity. Significant attributes for perceived risk of tobacco use in COVID-19 disease causation and severity were included in multivariable logistic regression analysis to quantify strength of association using crude and adjusted odds ratio (OR). Similarly, relationship between perceived risk of tobacco use in COVID-19 disease and tobacco cessation advice giving behaviour was done using univariate logistic regression. A p-value of <0.05 was considered as statistically significant.

### Operational definitions used in the study:

**Educational stream:** Based on the last academic degree achieved the study participants were classified in to different educational streams like modern medicine (undergraduate/ postgraduate/ superspecialist), nursing (undergraduate/ postgraduate), dental (undergraduate/ postgraduate), AYUSH (undergraduate/ postgraduate).

**Ever tobacco user:** Who have ever used tobacco products in their lifetime.<sup>21</sup>

**Current tobacco user:** Who have used tobacco products in the preceding 1 month from the date of responding to 'google form'.<sup>21</sup>

**Daily tobacco user:** Who reported to use tobacco products daily.<sup>21</sup>

### RESULTS

**Distribution of the study participants across India:** As presented in **Figure 1**, Most of the responses were received from Bihar (36.5%) followed by West Bengal (7.6%), Delhi (7.1%) and Uttar Pradesh (6.0%).

**Background characteristics of the study participants:** The mean age of the study participants was 31.3 years with standard deviation of 7.8 years (range: 22-68 years). Majority of the study participants aged below 30 years (52.0%) and male (62.0%) by gender. Doctor constituted more than two-third (70.2%) of the study participants while the others being nurses. More than two-third (68.0%) of the participants had vulnerable population at home with elderly being most common (44.1%) followed by persons with chronic disease (32.4%) and children (30.3%). Among the participants about one-third (32.6%) have ever used tobacco products while 23.4% and 16.9% were current and daily tobacco users respectively.



**Figure 1: Map of India showing distribution of the study participants as per their present residing state or union territory (n=687)**

**Table 1: Background characteristics of the study participants (n=687)**

Variable	HCP* (%)
<b>Age in completed years</b>	
<30	357 (52.0)
30-39	237 (34.5)
40-49	59 (8.6)
≥50	34 (4.9)
<b>Gender</b>	
Male	426 (62.0)
Female	261 (38.0)
<b>Occupation</b>	
Doctor	482 (70.2)
Nurse	205 (29.8)
<b>Educational Stream</b>	
Modern medicine undergraduate	209 (30.4)
Modern medicine postgraduate	199 (29.0)
Modern medicine superspecialist	11 (1.6)
Nursing undergraduate	170 (24.7)
Nursing postgraduate	35 (5.1)
Dental undergraduate	27 (3.9)
Dental postgraduate	6 (0.9)
AYUSH@ undergraduate	30 (4.4)
<b>Marital Status</b>	
Currently married & staying with spouse	246 (35.8)
Currently married but not staying with spouse	87 (12.7)
Currently unmarried	349 (50.8)
Divorced/Separated	5 (0.7)
<b>Vulnerable population at home:</b> (multiple response)	
Children aged <10 years	208 (30.3)
Elderly aged ≥60 years	303 (44.1)
Persons with chronic disease#	223 (32.4)
Not Applicable	220 (32.0)

\*HCP: Health Care Professional; @AYUSH: Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy; #i.e., HTN, DM

**Table 2: Perception and practices related to tobacco use in context of COVID-19 among the study participants (n=687)**

Variable	HCP (%)
<b>Perceived that tobacco increases the risk of COVID-19 infection: (Yes)</b>	433 (63.0)
<b>Perceived that tobacco increases severity of COVID-19 infection: (Yes)</b>	535 (77.9)
<b>Perceived form of tobacco that increases the risk:</b>	
Only smoking	346 (50.4)
Only smokeless tobacco	34 (4.9)
Both smoking and smokeless tobacco	256 (37.3)
None	51 (7.4)
<b>Ever tobacco user: (Yes)</b>	224 (32.6)
<b>Current tobacco user: (Yes)</b>	161 (23.4)
<b>Daily tobacco user: (Yes)</b>	116 (16.9)
<b>Ever came in unprotected contact with a suspect/confirmed COVID-19 case: (Yes)</b>	245 (35.7)
<b>Ever diagnosed with COVID-19: (Yes)</b>	147 (21.4)
<b>Ever advised patient to refrain from tobacco: (Yes)</b>	508 (73.9)
<b>Ever advised relatives to refrain from tobacco: (Yes)</b>	458 (66.7)

One-third of participants (35.7%) had unprotected contact history with a suspected or confirmed COVID-19 case and about one-fifth (21.4%) reported to have diagnosed with COVID-19. About three-fifth (63.0%) and three-fourth (77.9%) of the participants perceived tobacco use as risk factor of COVID-19 disease causation and severity respectively. Majority of them have advised their patients (73.9%) and family members (66.7%) to refrain from tobacco. (Table 1 and 2)

#### Determinants of perceived risk of tobacco as risk factor for COVID-19:

On univariate analysis, participants who were aged below 30 years, nurse by occupation, belonged to nursing/dental/AYUSH educational stream, perceived smoking only and both smoking and smokeless tobacco increases risk, ever, current and daily tobacco user, had unprotected contact history with a suspected or confirmed COVID-19 case were more likely to perceive the risk of tobacco use in COVID-19 disease causation. Notably, study participants who were married and staying with their partner were less likely to perceive the risk of tobacco use in COVID-19 causality. The significant attributes of perceived risk of tobacco use as risk factor for COVID-19 disease severity were age, marital status, perceived tobacco form that increases risk and tobacco use status. In multivariable logistic regression analysis; educational stream (Dental) [adjusted odds ratio (AOR): 3.25 (1.25-8.42)] (AYUSH) [AOR: 3.00 (1.15-7.80)], marital status (married and staying with partner) [AOR: 0.43 (0.26-0.71)], perception of tobacco form that increases risk (smoking only) [AOR: 11.64 (5.96-22.71)] (both smoking and smokeless tobacco) [AOR: 22.25 (11.09-44.63)] and current tobacco user (yes) [AOR: 1.59 (1.04-2.42)] were significantly associated with perceived risk of tobacco use in COVID-19 causation. Marital status (married and staying with partner) (0.50 (0.28-0.88) and perception of tobacco form that increases risk (smoking only) [AOR: 12.93 (7.31-22.87)] (both smoking and smokeless tobacco) [AOR: 27.78 (14.40-53.59)] were independent determinants of perceived risk of tobacco use in COVID-19 severity. (Table 3 and 4)

#### Risk perception of tobacco in COVID-19 and tobacco cessation advice giving behaviour:

Participants who perceived the risk of tobacco use in COVID-19 causation were more likely to advice tobacco cessation to their patients [crude odds ratio (COR): 3.53 (2.47-5.03)] and family members [COR: 2.98 (2.14-4.14)]. Similarly, those who perceived tobacco as risk factor for severe COVID-19 were more likely to advice tobacco cessation to their patients [COR: 2.46 (1.68-3.61)] and family members [COR: 1.88 (1.30-2.72)].

**Table 3: Distribution of the study participants as per their perceived risk of tobacco use in COVID-19 disease causation and severity (n=687)**

Variable	Total (%)	Perceived tobacco as risk factor of COVID-19- N (%)			
		Infection: (Yes) (n=433) (63.0%)	p-value*	Severity: (Yes) (n=535) (77.9%)	p-value*
<b>Age in completed years: (median 29)</b>					
<30	357 (52.0)	240 (67.2)	0.018	291 (81.5)	0.017
≥30	330 (48.0)	193 (58.5)		244 (73.9)	
<b>Gender</b>					
Male	426 (62.0)	264 (62.0)	0.464	332 (77.9)	0.962
Female	261 (38.0)	169 (64.8)		203 (77.8)	
<b>Occupation</b>					
Doctor	482 (70.2)	290 (60.2)	0.017	379 (78.6)	0.464
Nurse	205 (29.8)	143 (69.8)		156 (76.1)	
<b>Educational Stream</b>					
Modern medicine	419 (61.0)	240 (57.3)	0.001	330 (78.8)	0.919
Nursing	205 (29.8)	144 (70.2)		157 (76.6)	
Dental	33 (4.8)	25 (75.8)		25 (75.8)	
AYUSH	30 (4.4)	24 (80.0)		23 (76.7)	
<b>Marital Status</b>					
Currently married and staying with spouse	246(35.8)	131(53.3)	<0.001	182(74.0)	0.031
Currently married but not staying with spouse	87(12.7)	68(78.2)		67(77.0)	
Currently unmarried	349(50.8)	232(66.5)		284(81.4)	
Divorced/ separated	5(0.7)	2(40.0)		2(40.0)	
<b>Vulnerable population at home</b>					
Yes	467 (68.0)	295 (63.2)	0.911	355 (76.0)	0.087
No	220 (32.0)	138 (62.7)		180 (81.8)	
<b>Perceived form of tobacco that increases the risk</b>					
Only smoking	346(50.4)	218(63.0)	<0.001	281(81.2)	<0.001
Only smokeless tobacco	34(4.9)	14(41.2)		17(50.0)	
Both smoking and smokeless tobacco	256(37.3)	201(78.5)		231(90.2)	
None of the above	51(7.4)	0(0.0)		6(11.8)	
<b>Ever tobacco user</b>					
Yes	224 (32.6)	121 (54.0)	0.001	170 (75.9)	0.384
No	463 (67.4)	312 (67.4)		365 (78.8)	
<b>Current tobacco user</b>					
Yes	161 (23.4)	84 (52.2)	0.001	119 (73.9)	0.166
No	526 (76.6)	349 (66.3)		416 (79.1)	
<b>Daily tobacco user</b>					
Yes	116 (16.9)	58 (50.0)	0.001	80 (69.0)	0.011
No	571 (83.1)	375 (65.7)		455 (79.7)	
<b>Ever came in unprotected contact with a suspect or confirmed COVID-19 case</b>					
Yes	245 (35.7)	139 (56.7)	0.011	194 (79.2)	0.538
No	442 (64.3)	294 (66.5)		341 (77.1)	
<b>Ever diagnosed with COVID-19</b>					
Yes	147 (21.4)	86 (58.5)	0.200	119 (81.0)	0.311
No	540 (78.6)	347 (64.3)		416 (77.0)	
<b>Ever advised patient to refrain from tobacco</b>					
Yes	508(73.9)	360(70.9)	<0.001	418(82.3)	<0.001
No	179(26.1)	73(40.8)		117(65.4)	
<b>Ever advised relatives to refrain from tobacco</b>					
Yes	458(66.7)	328(71.6)	<0.001	374(81.7)	.001
No	229(33.3)	105(45.9)		161(70.3)	

\*Chi square test, AYUSH: Ayurveda, Yoga &amp; Naturopathy, Unani, Siddha and Homoeopathy

**DISCUSSION**

It was an explorative cross-sectional online survey among HCPs of India with fair amount of participation across different states and union territories. In the survey, every third out of five surveyed perceived tobacco as risk factor for COVID-19 disease causation and its severity. Perception of tobacco as risk factor

for COVID-19 significantly determined their tobacco cessation advice giving behaviour.

**Perceived risk of tobacco uses in context of COVID-19:** Perceived risk of tobacco use in COVID-19 disease causation and severity among HCPs of the present study were found to be 63.0% and 77.9% respectively.

**Table 4: Univariate and multivariable logistic regression analysis showing determinants of perceived risk of tobacco use in COVID-19 disease causation and severity among the study participants (n=687)**

Variable	Perceived tobacco as risk factor of COVID-19			
	Infection: Yes=433 (63.0%)		Severity: Yes= 535 (77.9%)	
	COR (95%CI)	AOR (95%CI)	COR (95%CI)	AOR (95%CI)
<b>Age in completed years:</b> (median 29)				
<30	1.46 (1.06-1.98)	0.89 (0.54-1.44)	1.55 (1.08-2.23)	0.90 (0.53-1.53)
≥30	Ref.	Ref.	Ref.	Ref.
<b>Occupation</b>				
Doctor	Ref.	-	Ref.	-
Nurse	1.53 (1.08-2.17)	-	0.86 (0.59-1.27)	-
<b>Educational Stream</b>				
Modern medicine	Ref.	Ref.	Ref.	-
Nursing	1.76 (1.23-2.51)	1.39 (0.90-2.16)	0.88 (0.59-1.31)	-
Dental	2.33 (1.02-5.29)	3.25 (1.25-8.42)	0.84 (0.36-1.93)	-
AYUSH	2.98 (1.19-7.45)	3.00 (1.15-7.80)	0.89 (0.37-2.13)	-
<b>Marital Status</b>				
Currently married and staying with spouse	0.58 (0.42-0.81)	0.43 (0.26-0.71)	0.68 (0.46-0.99)	0.50 (0.28-0.88)
Currently married but not staying with spouse	1.83 (1.06-3.19)	1.77 (0.89-3.51)	0.80 (0.45-1.40)	0.59 (0.29-1.19)
Currently unmarried/ divorced/ separated	Ref.	Ref.	Ref.	Ref.
<b>Perceived form of tobacco that increases the risk</b>				
Only smoking	8.64 (4.68-15.95)	11.64 (5.96-22.71)	11.65 (6.73-20.18)	12.93 (7.31-22.87)
Both smoking and smokeless	18.53(9.71-35.36)	22.25(11.09-44.63)	24.91(13.2-46.85)	27.78(14.40-53.59)
Only smokeless tobacco/ none	Ref.	Ref.	Ref.	Ref.
<b>Ever tobacco user<sup>2</sup></b>				
Yes	Ref.	-	Ref.	-
No	1.76 (1.27-2.44)	-	1.18 (0.81-1.72)	-
<b>Current tobacco user</b>				
Yes	Ref.	Ref.	Ref.	Ref.
No	1.81 (1.26-2.59)	1.59 (1.04-2.42)	1.33 (0.89-2.01)	1.18 (0.74-1.90)
<b>Daily tobacco user<sup>2</sup></b>				
Yes	Ref.	-	Ref.	-
No	1.91 (1.28-2.86)	-	1.77 (1.13-2.75)	-
<b>Ever came in unprotected contact with a suspect or confirmed COVID-19 case</b>				
Yes	Ref.	Ref.	Ref.	-
No	1.51 (1.10-2.09)	1.04 (0.71-1.52)	0.89 (0.61-1.29)	-
<b>Nagelkerke R<sup>2</sup></b>				
	-	.271	-	.278
<b>Hosmer Lemeshow test p-value</b>				
	-	.351	-	.130
<b>Predictive Accuracy Rate (PAR)</b>				
	-	71.8	-	83.6

AYUSH: Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy; COR: crude odds ratio; CI: confidence interval; AOR: adjusted odds ratio; <sup>1</sup>excluded from the multivariable model due to multicollinearity with educational stream ( $\rho = 0.672$ ,  $p < 0.01$ ); <sup>2</sup>excluded from the multivariable models due to multicollinearity with current tobacco user. After analysing correlation matrix of ever, current and daily tobacco user (not shown), current tobacco user variable seemed to best represent ever tobacco user ( $\rho = 0.781$ ,  $p < 0.01$ ) and daily tobacco user ( $\rho = 0.815$ ,  $p < 0.01$ ). Thus, current tobacco user variable was used in the multivariable model.

Similar findings of perceived risk of tobacco use in COVID-19 causation and severity have been reported from US.<sup>22,23</sup> Chertok<sup>22</sup> reported 75.4% and 93.0% of the community dwellers to have perceived smoking as a risk factor for COVID-19 disease causation and severity. In another study by Streck et al.<sup>23</sup>, 80% of the tobacco users receiving buprenorphine treatment for opioid use disorder perceived that smoking increased their risk of contracting COVID-19 or having a more severe disease. Similarity between findings of the present study and other studies conducted in different study population reflects that overall tobacco use is perceived as risk factor for COVID-19 irrespective of study settings and population.

**Predictors of Perceived risk of tobacco use in COVID-19 disease causation and severity:** Educational stream emerged as one of the attributes of perceived risk for tobacco in COVID-19 causation in the present study with dentists and AYUSH practitioners perceived higher risk compared to modern

medicine practitioners. Dentists, due to the nature of their job, are at higher risk of contracting the COVID-19. This could be the reason behind their perceived risk as explained by health belief model.<sup>23</sup> In an Italian study by Gambarini et al.<sup>24</sup>, 70% of dental practitioners perceived themselves at higher risk of contracting COVID-19 compared to others. Moreover, in India modern medicine practitioners and nursing personnel were deployed in active management of COVID-19 cases. Prolonged contact with COVID-19 cases and suspects might have blunted their overall risk perception for the disease. Thus, there was implied need of re-sensitisation of modern medicine practitioners and nursing personnel regarding the lethality of COVID-19.

Participants who were married and staying with partner in the present study were less likely to perceive tobacco as risk factor for COVID-19 causation and severity in our study. Married persons tend to have lower risk perception for lethality of COVID-19 disease compared to others as reported by a study in

China by He et al.<sup>25</sup> Moreover, risk perception for a disease is negatively correlated with mental health of an individual especially during a pandemic.<sup>26</sup> Those who were married and living with their spouse are more likely to be mentally supported and thus less vulnerable to psychological illnesses like anxiety and depression.<sup>27</sup> All these supports our observation in this regard.

Participants who considered smoke form alone or smoke and smokeless forms together increases the risk of COVID-19 had higher odds of perceiving tobacco as risk factor for both COVID-19 disease and its severity compared to others. People who perceive tobacco as harmful for health tend to perceive it harmful in any form. Those who underestimate hazards of tobacco are more likely to use it subsequently in future.<sup>28</sup> All these supports our observation in this regard. Similarly, current tobacco users in the present study were less likely to perceive tobacco as risk factor for COVID-19 causation and severity in the present study. This was in line with the findings of Yang et al.<sup>29</sup> which reported that current smokers were less likely to acknowledge the health consequences of smoking than non-smokers and former smokers. This might be because tobacco users merely acknowledge harmful effects of tobacco<sup>30</sup>. Health belief model also supports such observation as tobacco use modifies perceived susceptibility of hazards associated with it.<sup>31,32</sup>

### Perceived risk and tobacco cessation advice giving behaviour

HCPs, who perceived risk of tobacco use in COVID-19 disease causation and severity, were more likely to advice for tobacco cessation in the present study. Consistence findings have been reported by Abdulateef et al.<sup>31</sup> In that study 72.2% of the physicians who never smoked reported to persuade their patients to stop smoking on every visit whereas only 56.0% of ever smoker physicians have reported to done the same. It is being already known that HCPs who use tobacco products themselves are less likely to advice tobacco cessation to their patients.<sup>31</sup> In a study in Egypt by Mostafa et al.<sup>32</sup>, 72.6% of the non-smoker physician opined that smoking status directly influence smoking cessation counselling skill of a physician whereas only 30.4% smoker physician have agreed to that fact. Lower risk perception regarding hazards of smoking among smoker HCPs might be the probable cause of poor tobacco cessation counselling practices. Thus, tobacco use should be strongly discouraged among them.

### Limitations of the study

To the best of our knowledge, this is the only study among a large pool of HCPs from India till date which has assessed the perceived risk of tobacco use in COVID-19 causation and severity. Due to self-administer method of data collection in this online survey, the reporting, professional and social desirability biases cannot be completely ruled out. The

prior-mentioned biases would be low in our study as the participants are in responsible position related to health and highly educated. In addition, participation was voluntary and anonymous, and the participants were ensured of confidentiality. Generalizability is limited due to non-representative distribution of participants across India. However, participation from different states and union territories of India indicates to some extent the common belief hold by the HCPs in India regarding the tobacco use as a risk in COVID-19 causation and severity.

### CONCLUSIONS

Three in every five HCPs perceived tobacco use as a risk in causation and severity of COVID-19. Perceived risk of tobacco as risk factor for COVID-19 was lower among tobacco users compared to non-tobacco users. Perceived risk of tobacco use in COVID-19 was found to be significantly influencing the behaviour of HCPs in offering advice for tobacco cessation. HCPs are the role model and torch bearer of tobacco control campaign. Thus, they need to refrain themselves from tobacco use in any form. Sensitization workshops on several aspects of tobacco control need to be organized for HCPs periodically.

### ABBREVIATIONS

AYUSH: Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy; BAMS: Bachelor of Ayurvedic Medicine and Surgery; BDS: Bachelor of Dental Surgery; BHMS: Bachelor of Homeopathic Medicine and Surgery; BSc: Bachelor of Science; BUMS: Bachelor of Unani Medicine and Surgery; DM: Doctorate of Medicine; DNB: Diplomate of National Board; FCTC: framework convention on tobacco control; HCP: Healthcare Professional; MBBS: Bachelor of Medicine and Bachelor of Surgery; MCh: Master of Chirurgiae; MD: Doctor of Medicine; MDS: Master of Dental Surgery; MS: Master of Surgery; MSc: Master of Science; SPSS: Statistical Package for Social Sciences; WHO: World Health Organisation.

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