

RESEARCH COMMUNICATION

Insights into the Tobacco Cessation Scenario among Dental Graduates: An Indian Perspective

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Abstract

Introduction: To curb the ever growing menace of tobacco and its ill effects, it is essential to prevent its usage. Dental professionals' contributions can be invaluable in this venture. **Objectives:** To assess Indian dental graduates' knowledge, attitude and practices towards tobacco cessation; perceived effectiveness in pursuing tobacco cessation activities; perception of factors that interfere in tobacco cessation as barriers; and willingness to participate in tobacco cessation. Further, to determine associations among the aforementioned variables. **Methodology:** All house surgeons in Manipal College of Dental Sciences, Manipal University, Mangalore were included in the study. A structured, pre-tested and self-administered questionnaire was employed to assess participants' knowledge, attitude, behavior, perceived effectiveness, perceived barriers and willingness to participate in tobacco cessation. Information regarding respondents' age, gender and residence was collected. **Results:** A total of 100 out of 103 respondents participated in the study. Mean knowledge, attitude, behavior, perceived effectiveness, perceived barrier scores were 17.6 ± 2.53 (73.2%), 72.1 ± 6.59 (90.2%), 28.3 ± 5.12 (67.4%), 13.3 ± 5.36 (53.16%) and 35.0 ± 3.79 (89.8%) respectively. Overall, 97% respondents were willing to participate in tobacco cessation activities. Correlation analysis revealed that knowledge was associated with attitude ($r=0.36$, $p=0.00$) and perceived barriers ($r=0.34$, $p=0.00$) and behavior was associated with perceived barriers ($r=0.22$, $p=0.03$). **Conclusions:** Respondents reported high knowledge and attitude scores, along with high perceived barriers scores and willingness to participate in tobacco cessation activities. Present study highlights the need for a more meaningful involvement of dental professionals in tobacco cessation and has policy implications for curriculum changes regarding the same.

Keywords: Tobacco cessation - dental students - Indian context - questionnaire study - willingness to participate

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Introduction

It is an established fact that tobacco usage is associated with many of the fatal but preventable diseases (World Health Organization, 2009; U.S. Department of Health and Human Services, 2012). Tobacco related morbidity and mortality is on the rise in spite of advances in the diagnosis and treatment (Ezzati and Lopez, 2004; Murthy and Mathew, 2004; Danaei et al., 2005). Presently, it has been estimated that tobacco usage causes more than five million deaths worldwide, which is expected to rise up to more than eight million per year by 2030 (Mathers and Loncar, 2006; WHO, 2009:2011). Tobacco usage increases the risk of many of the fatal diseases such as cancer (Johnson, 2001; Winn, 2001; Ezzati et al, 2005; Kanavos, 2006; Mellsted, 2006), stroke (Murray and Lopez, 1997; Lloyd-Jones et al., 2010), cardiovascular (Ezzati et al., 2005; White 2007; Deatona et al., 2011), and respiratory diseases (Zhang and Cai, 2003; Zhang et al., 2011) etc. Tobacco related morbidity and mortality accounts for high economic burden worldwide (John et al., 2009; WHO, 2011; Wu and Sin, 2011). The most effective

way to curb this menace is by focusing on the cessation of its usage. Research into tobacco cessation measures worldwide has shown many benefits, further strengthening the requirement of aggressive measures to stop tobacco usage (U.S. Department of Health and Human Services, 1990; Samet, 1992; Pelkonen et al., 2001; Kenfield et al., 2008; Jang et al., 2010; Murthy and Saddicchha, 2010; Wu and Sin, 2011).

Tobacco related mortality in India is among the highest in the world (Shah et al., 2008; Murthy and Saddicchha, 2010). In developing countries like India, one can observe increasing trends in consumption of tobacco, leading to rising incidences of tobacco related cancers and other illnesses (Gajalakshmi et al., 2003; Murthy and Saddicchha, 2010). Limited resources to tackle these problems can also be observed in India. Hence, involving health professionals other than conventional medical personnel might be a crucial step in enhancing the effectiveness of tobacco cessation activities (Murthy and Saddicchha, 2010).

Due to their close interaction with the patients, well motivated dental health professionals can be of immense

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help in preventing tobacco threat. They can play a pivotal role in the detection of tobacco habits and their ill effects among their patients. They can also play a major role in tobacco cessation activities among their patients (Tomar, 2001; Gansky et al., 2002; Warnakulasuriya, 2002; Carr and Ebbert, 2006). If employed effectively, health professional students can also be a useful resource for tobacco cessation activities.

Dental students being future of their profession are an inseparable part of initiatives directed towards reducing the ever growing menace of tobacco (Rikard-Bell et al., 2003; Polychonopoulou et al., 2004; Cannick et al., 2006; Vanobbergen et al., 2007; Rajasundaram et al., 2011). It is essential to assess the knowledge, attitude and practices of the dental students towards the tobacco cessation of their patients. Further it is essential to determine the perceived effectiveness and perceived barriers of the dental students towards tobacco cessation. There are numerous barriers to practice of tobacco cessation activities among health professionals. Once these barriers are identified, they can be eliminated or their effect can be minimized for effective tobacco cessation activities.

There is a definite paucity of information regarding the comprehensive assessment of various issues related to tobacco cessation, as earlier investigations have focused on one or a few of the concerned issues. It is crucial to investigate all the issues simultaneously on a single population to explore interactions between them. This might eventually pave the way for effective tobacco cessation practices. Therefore, the present study aimed at assessing the knowledge, attitude, behavior, perceived effectiveness, perceived barriers of dental graduates towards tobacco cessation and to determine if any association existed between these parameters. Aim of the study also included enquiring about the dental graduates willingness to participate in tobacco cessation activities and the modalities used by them to help patients quit tobacco. The present study is the first investigation to explore all these aforementioned issues simultaneously among one dental student population.

Materials and Methods

The present study was conducted among dental students in Mangalore city, Karnataka, India. The students in the last year of their professional training (internship) at Manipal College of Dental Sciences (MCOADS), Manipal University, Mangalore were included in the study. Ethical clearance was obtained from the Institution Ethics Committee, MCOADS, Mangalore. Permission was also obtained from Head of the Institution of the aforementioned dental college and informed consent was obtained from the study subjects. A cross-sectional questionnaire design was employed in the present study. A structured, pretested, self-administered questionnaire was employed in the present study. Apart from the demographic data such as age, gender, and place of residence, the questionnaire comprised of 86 items. A total of 24 questions were used to assess the knowledge of dental graduates, which focused on tobacco and its effects on general and oral health, passive smoking,

nicotine dependence, 5A's and 5R's of tobacco cessation guidelines. A total of 16 questions evaluated the attitude of dental graduates towards dentist's role in tobacco cessation, requirement of specific training for dentists in tobacco cessation, routine enquiry of tobacco habits of patients by dentists, smoking in public, smoking around children and advertisement of tobacco products. Questions pertaining to behavior addressed whether dental interns ask, advice, assist and follow up patients to help them quit tobacco. Questionnaire also enquired about their worksite related aspects; prior training in tobacco cessation; their willingness to participate in tobacco cessation activities; modalities used by them to help patients quit tobacco; their familiarity with WHO document titled "Framework Convention on Tobacco Control (FCTC)" and "Cigarettes and Other Tobacco Products [prohibition] Act (COTPA)". Five items assessed the self perceived effectiveness of interns in undertaking tobacco cessation activities in their practice, identifying the signs of nicotine dependence, withdrawal effects, precancerous, cancerous and other tobacco related oral diseases. Dental graduates' perception towards the factors which can interfere in the tobacco cessation activities as barriers was assessed using 13 items. The range of possible scores for knowledge, attitude, behavior, perceived effectiveness and perceived barriers were 0-24, 1-80, 1-42, 1-25 and 1-39 respectively. Correct answers for Knowledge items were scored 0 or 1 based on accuracy of the answer. Five point likert scale was employed for attitude and perceived effectiveness domains, whereas for behavior and perceived barriers domain 3 point likert scale was used. Prior to the start of the main study, the questionnaire was pilot tested on 53 study subjects.

Data was entered into the computer (MS Excel, MS Word). Data analysis was conducted by employing Statistical Package for Social Sciences (SPSS), version 16.0 (SPSS Inc, Chicago IL). The Cronbach's alpha and split half reliability values were obtained for each of the domains of the questionnaire. Student's t test was employed to assess differences in various domains among age, sex and residence. Correlation analysis was performed for correlation among demographic variables and domains; and also among various domains by employing Pearson's correlation.

Results

The results of the pilot study indicated that the Cronbach's alpha and split half reliability values for various domains of the questionnaire were acceptable. The Cronbach's alpha and split half reliability values for knowledge were found to be 0.67 and 0.67 respectively, while that for attitude were 0.89 and 0.83; for behavior were 0.85 and 0.86; for perceived effectiveness were 0.83 and 0.59; and for perceived barriers were 0.76 and 0.67. A total of 100 out of 103 respondents participated in the final study, with a response rate of 97.1%. A majority of 75 (75%) respondents were aged ≤ 24 , while 25 (25%) were aged > 24 yrs. The number of male respondents was 46, while the number of female respondents was 54. A total of 52 respondents were residing in hostel, while a total

Table 1. Demographic Characteristics and Mean (SD) Domain Scores of Study Subjects

Demographic variables	No.	Knowledge	Attitude	Behaviour	Perceived effectiveness	Perceived barriers
Age	≤24 yrs	75 17.8 (2.16)	73.1 (5.83)	28.2 (4.73)	12.1 (4.87)	35.3 (3.38)
	>24 yrs	25 16.8 (3.32)	69.2 (7.94) (p=0.01)**	28.8 (6.28)	16.9 (5.26) (0.00)***	34.3 (4.83)
Sex	Male	46 17.0 (3.05)	70.0 (6.99)	28.7 (6.02)	14.4 (5.47)	34.3 (4.14)
	Female	54 18.1 (1.85) (p=0.03)*	73.9 (5.72) (p=0.00)***	28.0 (4.28)	12.4 (5.13) (p=0.05)*	35.7 (3.37)
Address	Hostel	52 17.8 (2.34)	72.9 (6.73)	28.8 (5.39)	12.0 (4.74)	35.0 (3.33)
	Non-hostel	48 17.3 (2.72)	71.3 (6.40)	27.8 (4.85)	14.7 (5.68) (p=0.01)**	35.0 (4.27)
Total	100	17.6 (2.53)	72.1 (6.59)	28.3 (5.12)	13.3 (5.36)	35.0(3.79)
Percentage		73.3	90.1	67.4	53.2	89.7
Correlation analysis of demographic variables with various domains:						
Age		- 0.18 (0.07)	-0.0025	0.06 (0.56)	0.39*** (0.00)	- 0.12 (0.26)
Sex		0.22* (0.03)	0.30*** (0.00)	-0.07 (0.50)	0.19*(0.05)	0.19 (0.06)
Address		- 0.10 (0.31)	- 0.12 (0.22)	-0.10 (0.33)	0.25** (0.01)	0.00 (0.98)
Correlation analysis among various domains:						
Knowledge		1	-	-	-	-
Attitude		0.36** (0.00)	1	-	-	-
Behaviour		0.10 (0.34)	0.17 (0.09)	1	-	-
Perceived effectiveness		-0.13 (0.21)	-0.15 (0.13)	-0.09 (0.39)	1	-
Perceived barriers		0.34** (0.00)	0.15 (0.15)	0.22* (0.03)	-0.17 (0.09)	1

* significant at 5% level of significance, ** significant at 1% level of significance, *** significant at 0.1% level of significance

Table 2. Willingness to Participate, Previous Training and Familiarity with WHO-FCTC and COTPA among Study Subjects

Demographic variable	Willingness		Previous training		WHO FCTC		COTPA		
	Yes	No	Yes	No	Yes	No	Yes	No	
Age	≤24 yrs	74 (98.7%)	1 (1.3%)	4 (5.30%)	71 (94.7%)	49 (65.3%)	26 (34.7%)	62 (82.7%)	13 (17.3%)
	>24 yrs	23 (92.0%)	2 (8.0%)	3 (12.0%)	22 (88.0%)	11 (44.0%)	14 (56.0%)	14 (56.0%)	11 (44.0%)
Sex	Male	43 (93.5%)	3 (6.5%)	5 (10.9%)	41 (89.1%)	25 (54.3%)	21 (45.7%)	35 (76.1%)	11 (23.9%)
	Female	54 (100%)	0	2 (3.70%)	52 (96.3%)	35 (64.8%)	19 (35.2%)	41 (75.9%)	13 (24.1%)
Address	Hostel	50 (96.2%)	2 (3.8%)	3 (5.80%)	49 (94.2%)	35 (67.3%)	17 (32.7%)	44 (84.6%)	8 (15.4%)
	Non-hostel	47 (97.9%)	1 (2.1%)	4 (8.30%)	44 (91.7%)	25 (52.1%)	23 (47.9%)	32 (66.7%)	16 (33.3%)
Total		97	3	7	93	60	40	76	24

of 48 were non-hostelites. The mean knowledge, attitude and behaviour scores were 17.6 (2.53), 72.1 (6.59) and 28.3 (5.12) respectively. The mean perceived effectiveness and perceived barriers scores were 13.3 (5.36) and 35.0 (3.79) respectively (Table 1). Results indicate that individuals aged ≤24 years had higher attitude scores (p=0.01) but lower perceived effectiveness scores (p=0.00) than those aged > 24 years. It can also be observed that female respondents had higher knowledge (p=0.03) and attitude (p=0.00) scores when compared with their male counterparts. Male respondents however reported higher perceived effectiveness scores than female respondents (p=0.05). Individuals not residing in hostel reported higher perceived effectiveness scores than those residing in hostels (p=0.01) (Table 1).

Results of correlation analysis indicate that there was a statistically significant association between age and attitude (r=-0.25, p=0.01), sex and attitude (r=0.30, p=0.00). Perceived effectiveness was significantly associated with age (r=0.39, p=0.00), sex (r=-0.19, p=0.05) and residence (r=0.25, p=0.01). Results also indicate that there was a statistically significant association of knowledge with attitude (r=0.36, p=0.00) and perceived barriers (r=0.34, p=0.00), and behavior with perceived barriers (r=0.22, p=0.03).

A total of 97% of the respondents reported that they were willing to undertake tobacco cessation activities, while 93% of the respondents indicated that they had not undergone any training in tobacco cessation. Overall, 60% of study subjects were familiar with WHO's FCTC and 76% of them were familiar with COPTA (Table 2).

A total of 60% of respondents reported that smoking was not allowed in their workplace premises and 63% of them reported that smoke-free policy was always enforced in their workplace. A majority (83%) of respondents reported that selling of tobacco was prohibited in their workplace premises and 43% reported that selling of tobacco was not prohibited near their workplace premises. A total of 89% of respondents reported that their environment at workplace encouraged them to smoke less (Table 3).

A majority of respondents reported that they did not use traditional remedies (53%), self-help materials (52%) or medication (48%) for tobacco cessation among their patients, while a majority of them reported the use of counseling (72% always and 18% sometimes) for the same (Table 4). Regarding perceived barriers, a majority of the respondents reported that patients not being interested, lack of awareness among patients and withdrawal effects as major barriers for tobacco cessation practices among

Table 3. Workplace Related Activities among Study Subjects

Workplace related activities	No. of study subjects (%)
Type of tobacco-free policy	
No smoking policy in place	40
Smoking rooms available	0
No smoking allowed at all in premises	60
Tobacco free policy enforced	
Always	63
Sometimes	28
Never	3
Unaware	6
Prohibition of selling of tobacco in working premises	
Always	83
Sometimes	6
Never	3
Unaware	8
Prohibition of selling of tobacco near working premises	
Always	20
Sometimes	28
Never	43
Unaware	9
Environment at work place influences to smoke	
More	11
Less	89

their patients (Table 5).

Discussion

Impact of tobacco on health poses a significant health problem the world over, especially in developing countries like India. It is one of the leading causes of morbidity and mortality, thus posing a definite threat to the health and welfare of individuals across the globe. The need for involvement of various health professionals to combat the tobacco menace has been highlighted (Murthy and Saddicchha, 2010). Dentists are at a unique position to help their patients quit tobacco. As the requirement of dental manpower in a densely populated country like India is very high, it is essential to look at other best avenues available. Studies conducted worldwide have shown that dental students can bridge this gap by actively participating in tobacco cessation activities (Rikard-Bell et al., 2003; Polychonopoulou et al., 2004; Cannick et al., 2006; Rajasundaram et al., 2011).

It is best and convenient to assess the perception and practices of the dental graduates as they are the best representatives of the dental student community. They have completed their academic studies and are going to shape the future of their profession. The findings obtained by research involving graduates can be used as baseline data to implement and if required modify the curriculum of dental education. This might pave way towards equipping dentists with the best of knowledge and also influence them in a positive way so that they can effectively undertake tobacco cessation activities in their practices.

The present study was conducted to explore various issues related to tobacco cessation among Indian dental graduates. This is the first study to explore knowledge, attitude, behavior, perceived effectiveness, perceived

Table 4. Types of Interventions Employed by Study Subjects among Patients

Types of interventions	Yes	No	Sometimes
Traditional remedies	27	53	20
Self- help materials	29	52	19
Counselling	72	10	18
Medication	32	48	20

Table 5. Perceived Barriers among Study Subjects

Perceived barriers	% study subjects (100)		
	Yes (3)	Unsure (2)	No (1)
Lack of awareness of patients	89	4	7
Patients not being interested	94	4	2
Lack of time	68	18	14
Patients are not compliant	85	13	2
Inadequate finances	64	23	13
Lack of resources	77	10	13
Lack of awareness among dentists	52	14	34
Lack of referral centers	80	15	5
Lack of training	84	10	6
Withdrawal effects	91	7	2
Fear of detecting cancer among patients	67	26	7
Peer pressure	88	9	3
Social pressure	80	12	8

barriers and willingness to participate in tobacco cessation activities simultaneously among a single dental graduate population.

In order to control and prevent tobacco hazards effectively, it is essential to understand effects of tobacco on the body. Although few studies have been conducted globally, there is paucity of studies in Indian scenario which assess the knowledge of dental professionals with respect to tobacco and its effects on general and oral health, passive smoking, nicotine addiction, safety of smokeless tobacco as compared to smoking tobacco. These questions were addressed in the knowledge domain of the present study.

The mean knowledge score of the respondents in the present study was observed to be 73.3%. This finding is similar to that of Rickard-Bell et al., who used 4 questions related to knowledge about smoking cessation counseling relevant to dentistry among all five years of dental students (Rickard-Bell et al., 2003). However, Polychonopoulou et al reported a knowledge score in the range of >90% for 8 out of the 10 knowledge based questions among 81 graduating students, which is more than the score observed in the present study (Polychonopoulou et al., 2004). The differences observed in the results could be attributed to differences in the number and type of questions, and also due to possible variation in the dental education curriculum of these countries.

Respondents in the present study scored 90.1% in the attitude domain, which represents a positive attitude of the study subjects. The positive impact of learning about tobacco and its ill effects on the body might be one of the reasons for this observation. This finding is in agreement with the results of Rajasundaram et al with 95% score, Tangade et al with 60-90% score, Polychonopoulou et al with 86-92% score, Yip et al with 32-85% score and

Cannick et al with 89% score (Yip et al., 2000; Cannick et al., 2002; Polychonopoulou et al., 2004; Rajasundaram et al., 2011; Tangade et al., 2011). In contrast to these results, a study reported negative attitude of Nigerian dentists and clinical dental students towards tobacco cessation activities (Omolara and Sofola, 2011).

Study subjects reported a score of 67.4% in the behavior domain, which is similar to the reports of Rikard-Bell et al with a score ranging from 1-68% and Yip et al with a score varying from 22-69% (Yip et al., 2000; Rikard-Bell et al., 2003). Rajasundaram et al reported that 94% of their study subjects advised their patients against smoking and 15.9% had helped a smoking patient to quit during their course (Rajasundaram et al., 2011).

Although study subjects reported higher knowledge and attitude scores, they had perceived effectiveness score of 53.2%. Only half of the study subjects thought that they can effectively undertake tobacco cessation activity in their practice. This could be attributed to lack of training in tobacco cessation, which calls for urgent need to implement tobacco cessation training in dental education. These results are in agreement with that of Rikard-Bell et al and Polychonopoulou et al, who reported that 54% and 50% respectively of their study subjects thought they would be effective (Rikard-Bell et al, 2003; Polychonopoulou et al., 2004). However, these results are in contrast with that of Rajasundaram et al, who observed that 80% of interns indicated that they lack skills to provide smoking cessation counseling, and Cannick et al who observed that only 14.1% of their study subjects were confident in their ability to help patients quit smoking (Cannick et al., 2006; Rajasundaram et al., 2011). Vanobbergen et al. also reported low perceived effectiveness in their study subjects (Vanobbergen et al., 2007). A total of 64% of the present study subjects reported that they can effectively identify tobacco related oral diseases, precancerous and cancerous conditions. However, only 33% of them indicated that they can identify signs of nicotine dependence and withdrawal symptoms. These finding indicates the scope for improvement in this sphere of dental education and further investigations regarding the same.

It is essential to identify perceived barriers in greater depth to eliminate or minimize their influence on tobacco cessation practices. In the present study most of the study subjects identified factors which might interfere in tobacco cessation activities as barriers with score being 89.7%. These results are in conformity with other studies reported by Yip et al, Rikard-Bell et al, Polychonopoulou et al, Pendharkar, Rajasundaram et al (Yip et al., 2000; Rikard-Bell et al., 2003; Polychonopoulou et al., 2004; Pendharkar, 2009; Rajasundaram et al., 2011).

Results of the present study also indicated that subjects who were ≤ 24 years of age had better attitude towards tobacco cessation than their older counterparts. This is in agreement with common notion that younger subjects are more enthusiastic and optimistic about their activities. However, subjects who were > 24 years of age had higher perceived effectiveness than the younger respondents. Males and nonhostelites had higher perceived effectiveness than their female and hostelite counterparts. The results concur with the general impression that males

and older individuals tend to be more confident than their female and younger counterparts.

Females scored better than males with respect to knowledge and attitude, but had low perceived effectiveness than males. This could be attributed partly to cultural reservations in India and further studies examining the association of gender with respect to knowledge, attitude and practices can elucidate on this issue.

The present study also explored the association among knowledge, attitude, behavior, perceived effectiveness, perceived barriers and the association of these variables with demographical variables. A pretested, structured, self-administered questionnaire was employed to assess various issues related to tobacco cessation activities among dental graduates in this investigation. This facilitates the employment of inferential statistics along with the conventional use of descriptive statistics.

Knowledge was found to be significantly associated with attitude of study subjects towards tobacco cessation and their perception of identifying factors which can interfere in tobacco cessation as barriers. These results are similar to the results of Vanobbergen et al who reported significant association between knowledge and attitude (Vanobbergen et al., 2007). In contrast to Pendharkar who reported no significant association of perceived barriers with knowledge, attitude and behavior of their study subjects, in the present study perceived barriers were significantly associated with knowledge and behavior (Pendharkar, 2009). Study subjects with good knowledge might be in better position to identify and report barriers more effectively, hence, might be more likely to engage in tobacco cessation practices with their patients.

Attitude was significantly associated with age and perceived effectiveness was associated with age, gender and place of residence of the study subjects. Increasing age might have a cumulative impact on attitude and perceived effectiveness of the respondents. Individuals residing outside the protective environs of the hostel might be more proactive in their mindset. This might be reflected in their approach to tobacco cessation too. The present study is first to assess the correlation of gender with respect to knowledge, attitude and practices of tobacco cessation activities. Cultural norms regarding gender and tobacco use might have an influence on these observations in the present study. Further studies are required to ascertain the practical implications of associations among these variables.

Overall, 60% of the subjects in the present study indicated that no smoking was allowed in the institution premises and 40% subjects reported that no smoking policy was in place. A total of 97% of the present study subjects were willing to undertake tobacco cessation activities in their practices, which is similar to other Indian study (Rajasundaram et al., 2011). Results also indicate that 93% of the respondents in the present study reported that they had not received any prior training in tobacco cessation; whereas in a study by Rajasundaram et al almost 50% of the study subjects said that they had been taught antismoking advice suitable for their patients (Rajasundaram et al., 2011). While 60% of the study subjects were familiar with the WHO document

titled FCTC, 76% of them were aware of COTPA. These findings further reinforce the high knowledge scores that are reported by the study subjects.

This investigation has to be viewed in the light of its limitations. Inclusion of one dental institution in India might not be entirely representative. The results of the present study have to be confirmed among a larger sample. Studies which involve the use of questionnaires entail acquiescence (yea-saying) bias, deviation (faking bad) bias and social desirability (faking good) bias. The tobacco related practices among the dental students themselves might have a considerable influence on their practices with their patients, which were not assessed in the present study. Further studies are essential to explore the impact of these issues on tobacco cessation activities in the dental background.

The present study highlights the need for effective and meaningful inclusion of dental professionals in general and dental students in particular, in prevention of tobacco usage and identifying early signs of tobacco related diseases. This study also has implications for curricular modifications with greater emphasis on tobacco cessation in the dental context. Inclusion of dental professionals in tobacco cessation might pave the way for combating the ill effects of tobacco more effectively, especially in developing countries like India with limited resources. Development of definitive guidelines for tobacco cessation activities in dental institutions, among general dental practitioners might have considerable contributions to make towards combating the tobacco menace.

In conclusions, 1) Study subjects aged ≤ 24 years reported higher attitude but lower perceived effectiveness when compared to those aged > 24 years. 2) Female respondents reported higher knowledge and attitude scores than their male counterparts, while males reported higher perceived effectiveness than female respondents. 3) Study subjects residing in hostel had lower perceived effectiveness than those not residing in hostels. 4) Age was significantly associated with attitude and perceived effectiveness, while sex was associated with knowledge, attitude and perceived effectiveness. Residence was also significantly associated with perceived effectiveness. 5) Knowledge was significantly associated with attitude and perceived barriers, while behaviour was significantly associated with perceived barriers. 6) A total of 97% of respondents reported that they were willing to undertake tobacco cessation activities, while 93% of respondents reported that they had lack of training on tobacco cessation activities. 7) Lack of awareness and interest among patients in quitting tobacco, and withdrawal effects emerged as important barriers for tobacco cessation activities among the study subjects. 8) The present study highlights the need for a more meaningful involvement of dental professionals in tobacco cessation and has policy implications for curricular changes regarding the same.

References

- Cannick GF, Horowitz AM, Reed SG, Drury TF, Day TA (2006). Opinions of South Carolina dental students toward tobacco use interventions. *J Public Health Dent*, **66**, 44-8.
- Carr A, Ebbert J (2006). Interventions for tobacco cessation in the dental setting. Cochrane database of systematic reviews, Issue 1, Art. No.: CD005084. DOI: 10.1002/14651858.CD005084.pub2.
- Danaei G, Vander Hoorn S, Lopez AD, Murray CJ, Ezzati M (2005). Comparative risk assessment collaborating group (Cancers). Causes of cancer in the world: comparative risk assessment of nine behavioural and environmental risk factors. *Lancet*, **366**, 1784-93.
- Deatona C, Froelicher ES, Wuc LH (2011). The global burden of cardiovascular disease. *Eur J Cardiovasc Nursing*, **10**, 5-13.
- Ezzati M, Lopez AD (2004). Regional, disease specific patterns of smoking-attributable mortality in 2000. *Tob Control*, **13**, 388-95.
- Ezzati M, Henley SJ, Lopez AD, Thun MJ (2005). Role of smoking in global and regional cancer epidemiology: current patterns and data needs. *Int J Cancer*, **116**, 963-71.
- Ezzati M, Henley SJ, Michael J, Thun MJ, Lopez AD (2005). Role of smoking in global and regional cardiovascular mortality. *Circulation*, **112**, 489-97.
- Gajalakshmi V, Peto R, Kanaka TS, Jha P (2003). Smoking and mortality from tuberculosis and other diseases in India: retrospective study of 43000 adult male deaths and 35000 controls. *Lancet*, **362**, 507-15.
- Gansky SA, Ellison JA, Kavanagh C, Hilton JF, Walsh M (2002). Oral screening and brief spit tobacco cessation counseling: A review and findings. *J Dent Educ*, **66**, 1088-98.
- Jang AS, Park SW, Kim DJ, et al (2010). Effects of smoking cessation on Airflow obstruction and quality of life in asthmatic smokers. *Allergy Asthma Immunol Res*, **2**, 254-9.
- John RM, Sung HY, Max W (2009). Economic cost of tobacco use in India, 2004. *Tob Control*, **18**, 138-43.
- Johnson N (2001). Tobacco use and oral cancer: A global perspective. *J Dent Educ*, **65**, 328-39.
- Kanavos P (2006). The rising burden of cancer in the developing world. *Annals of Oncol*, **17**, (15-23).
- Kenfield SA, Stampfer MJ, Rosner BA, Colditz GA (2008). Smoking and smoking cessation in relation to mortality. *JAMA*, **299**, 2037-47.
- Lloyd-Jones D, Adams RJ, Brown TM, et al (2010). Heart disease and stroke statistics-2010 update: A report from the American heart association. *Circulation*, **121**, 46-215.
- Mathers CD, Loncar D (2006). Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med*, **3**, 442.
- Mellsted H (2006). Cancer initiatives in developing countries. *Annals of Oncol*, **17**, (24-31).
- Murray CJ, Lopez AD (1997). Alternative projections of mortality and disability by cause 1990-2020: Global Burden of Disease Study. *Lancet*, **349**, 1498-504.
- Murthy NS, Mathew A (2004). Cancer epidemiology, prevention and control. *Current Science*, **86**, 518-27.
- Murthy P, Saddicchha S (2010). Tobacco cessation services in India: Recent developments and the need for expansion. *Indian J Cancer*, **47**, 69-74.
- Pelkonen M, Notkola IL, Tukiainen H, et al (2001). Smoking cessation, decline in pulmonary function and total mortality: a 30 year follow up study among the Finnish cohorts of the Seven Countries Study. *Thorax*, **56**, 703-7.
- Pendharkar B (2009). Fourth year dental students' barriers to tobacco intervention services. Thesis, university of iowa. <http://ir.uiowa.edu/etd/419>.
- Polychonopoulou A, Gatou T, Athanassouli T (2004). Greek dental students' attitudes toward tobacco control programmes. *Int Dent J*, **54**, 119-25.
- Rajasundaram P, Sequeira PS, Jain J (2011). Perceptions of dental students in India about smoking cessation counseling. *J Dent Educ*, **75**, 1603-10.

- Rikard-Bell G, Groenlund C, Ward J (2003). Australian dental students' views about smoking cessation counseling and their skills as counselors. *J Public Health Dent*, **63**, 200-6.
- Samet JM (1992). The health benefits of smoking cessation. *Med Clin North Am*, **76**, 399-414.
- Shah PB, Pednekar MS, Gupta PC, Sinha DN (2008). The relationship between tobacco advertisements and smoking status of youth in India. *Asian Pacific J Cancer Prev*, **9**, 637-64.
- Tangade PS, Ravishankar TL, Tirth A, Mathur A, Gupta V (2011). Attitude of dental students, interns and practicing dentists towards tobacco use cessation. *J Oral Health Comm Dent*, **5**, 15-8.
- Tomar SL (2001). Dentistry's role in tobacco control. *JADA*, **132**, 31-5.
- U.S. Department of Health and Human Services (2012). Preventing tobacco use among youth and young adults: A report of the surgeon general. Atlanta, GA: U.S. department of health and human services, Centers for disease control and prevention, National center for chronic disease prevention and health promotion, Office on smoking and health.
- US Department of Health and Human Services (1990). The health benefits of smoking cessation: a report of the surgeon general. Bethesda, MD: US public health service, Office on smoking and health; 1990.
- Uti OG, Sofola OO (2011). Smoking cessation counseling in dentistry: Attitudes of nigerian dentists and dental students. *J Dent Educ*, **75**, 406-12.
- Vanobbergen J, Nuytens P, Van Herk M, De Visschere L (2007). Dental students' attitude towards anti-smoking programmes: a study in Flanders, Belgium. *Eur J Dent Educ*, **11**, 177-83.
- Warnakulasuriya S (2002). Effectiveness of tobacco counseling in the dental office. *J Dent Educ*, **66**, 1079-87.
- White WB (2007). Smoking related morbidity and mortality in the cardiovascular setting. *Prev Cardiol*, **10**, 1-4.
- Winn DM (2001). Tobacco use and oral disease. *J Dent Educ*, **65**, 306-12.
- World Health Organisation (2009). WHO Report on the Global Tobacco Epidemic 2009: Implementing Smoke-free Environments. Geneva: WHO.
- World Health Organisation (2011). Economics of tobacco toolkit: assessment of the economic costs of smoking. Geneva: WHO.
- Wu J, Sin DD (2011). Improved patient outcome with smoking cessation: when is it too late? *Int J COPD*, **6**, 259-67.
- Yip JK, Hay JL, Ostroff JS, Stewart RK, Cruz GD (2000). Dental students' attitudes toward smoking cessation guidelines. *J Dent Educ*, **64**, 641-50.
- Zhang H, Cai B (2003). The impact of tobacco on lung health in China. *Respirology*, **8**, 17-21.
- Zhang J, Ou JX, Bai CX (2011). Tobacco smoking in China: prevalence, disease burden, challenges and future strategies. *Respirology*, **16**, 1165-72.