ORIGINAL ARTICLE

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© 2009 The Authors. Journal compilation © 2009 Blackwell Munksgaard A comparative study of oral health knowledge, attitude and behaviour of non-medical, para-medical and medical students in Udaipur city, Rajasthan, India

Abstract: Aim: The aim of the study was to assess and compare the Oral health knowledge, attitude and behaviour of the non-medical, para-medical and medical students. Material and methods: In a cross-sectional study, a total of 825 students (males - 577, females - 248) of six different professions belonging to non-medical, para-medical and medical categories were surveyed using a self-administered, structured questionnaire pretested through a pilot survey. The mean percentage scores, standard deviation and frequency distribution were calculated. The Student's t-test, anova test, Scheffe's test and chi-squared test were used as test of significance. The linear regression analysis was used to assess the relation of behaviour with knowledge and attitude. Results: The knowledge scores were significantly higher for the medical students compared with those of non-medical students. The attitude scores were significantly lower for the non-medical category compared with the other two categories and the scores were the highest among the paramedical students. The behaviour scores were significantly lower for the non-medical students than for the para-medical and the medical categories. All the scores were significantly higher for females than for the males. Regression analysis showed a linear relationship of behaviour with the attitude, but no significant linear relation with the knowledge. Conclusion: All the students showed low level of knowledge and the preventive behaviour among the students could still be improved. The results indicate that the knowledge was not enough to influence the oral health behaviour, but behaviour showed linear relationship with attitude of the students.

Key words: attitude; oral health behaviour; oral health knowledge; professional students

Introduction

Health is a valuable asset not only for an individual but also for any country. Any nation can progress rapidly when its people are healthy and lead a productive life. Since the adoption of WHO definition of health (1948), resources around the world have been trying to raise the critical consciousness of people to effect a change from existing disease-centric, painrelieving notion of health care to promoting a health-centric and well-being concept (1).

Central to these attempts has been the idea of health promotion through education, instruction and motivation. Creating supportive environments, strengthening community action and development of personal skills were among the principles outlined by Ottawa charter of WHO in 1986 for health promotion (2). An environment which is conductive for shifting the responsibility of public health from the shoulders of healthcare personnel to 'people's own hands' would essentially thrive upon the health education of population through its accurate knowledge and understanding of scientifically supported information and facts. 'Public health is the coalition of professions united by their shared mission' states the Institute of Medicine of the National Academy of Sciences (3).

The phrase 'coalition of professions' stresses that the achievement of better public health requires more than the participation of the various health professionals. So, in public health, individuals and groups band together to achieve a common goal (4).

Health promotion is an uphill task in a developing country like India, where the geo-socio-political and economic factors offer meagre and inadequate healthcare resources to its rapidly growing population. Moreover, the low literacy rates (65.38%) (5) further weaken the effort. The critical need in such scenario is sharing of responsibilities.

The oral health is now recognized as equally important in relation to general health. Sir William Osler has rightly stressed the significance of the oral cavity as the 'mirror' of general health (6). Various factors like nutritional status, tobacco smoking, alcohol, hygiene, stress are linked to a wide range of oral diseases forming the fundamental basis for the common risk factor approach (WHO 2000) to prevent oral diseases (7). Among these, oral hygiene is the most significant factor when it comes to prevention of oral diseases. The concept, importance and practice of oral hygiene are expected to be easily understood by all literate members of a population. The oral health concern of an individual is dependent on the attitude of a person. An attitude is a relatively enduring organization of beliefs around an object, subject or concept which predisposes one to respond in some preferential manner. Attitude is an acquired characteristic of an individual. People demonstrate a wide variety of attitudes towards teeth, dental care and dentists. These attitudes naturally reflect their own experiences, cultural perceptions, familial beliefs and other life situations and they strongly influence the oral health behaviour (8– 10). Attitudes are not learnt from text books; they are acquired by social interaction. Previous studies have shown that mass media, dental professionals and dental literature are the main sources of oral health information (11).

Health behaviour as defined by Steptoe et al. (1994) (12) is 'the activities undertaken by people to protect, promote or maintain health and to prevent disease'. The precise nature of the relationship between health-related attitudes, beliefs and behaviours is complex. The broad categories of factors that may influence individual and community health behaviour include: knowledge, beliefs, values, attitudes, skills, finance, materials, time and the influence of family members, friends, co-workers, opinion leaders and even health workers themselves (13). People who have assimilated the knowledge and feel a sense of personal control over their oral health are more likely to adopt self-care behaviour (14). Knowledge as defined by 'Oxford Dictionary' (15) is the 'expertise, and skills acquired by a person through experience or education'. The term knowledge is also used to mean the confident understanding (theoretical or practical) of a subject with the ability to use it for a specific purpose. The goal of oral health promotion is - knowledge to be shared with members outside the dental profession.

When we talk about the common oral diseases, caries and periodontal diseases are the two foremost oral pathologies that remain widely prevalent and affect all populations throughout the lifespan (16). The risk behaviours for dental caries and periodontal disease include frequent intake of sugary foods and drinks, irregular tooth brushing, smoking, alcohol consumption and irregular dental attendance (17). These risk behaviours that can be detrimental to the oral health could be habitual from early childhood or be initiated during adolescence related to an emerging autonomy from parental influence. Indeed, adolescence is a crucial period of transition (18–20) with personal responsibility for preventing dental disease beginning at this age and determining future oral health (21, 22).

One group of population that could be easily used for the purpose of assessing oral health awareness and practices among the young adult age group is the professional students. A profession is an occupation, vocation or career where specialized knowledge of a subject, field or science is applied (15). It is usually applied to occupations that involve prolonged academic training and a formal qualification. Studies on the oral health status and the oral health knowledge, attitude and behaviour of professional students towards oral health have been sparse. With the higher education background, the concept of prevention and well-being could be more easily understood, irrespective of their course of study (non-medical, para-medical or medical). Therefore, this study was conducted to assess and compare the oral health knowledge, attitude and behaviour of the non-medical, para-medical and medical students in Udaipur city, Rajasthan, India.

Materials and methods

An epidemiological survey was conducted from December 2007 to February 2008. Staged simple random sampling was performed. Six different professions belonging to the non-medical, para-medical and medical category (two professions belonging to each category) were randomly selected. A total of 825 students (males – 577, females – 248) participated in the survey, of which 133 students (males – 110, females – 23) were from Management college, 141 students (males – 101, females – 40) were from Engineering college, 139 students (males – 68, females – 71) were from Physiotherapy college, 140 students (males – 112, females – 28) were from Pharmacy college, 134 students (males – 100, females – 34) were from Homoeop-athy college and 138 students (males – 86, females – 52) were from Ayurveda college (Table 1).

A total of 274 students (males – 211 and females – 63) belonged to non-medical category which represents 39.14% of the total number of students pursuing undergraduate studies in colleges (Management and Engineering) belonging to this category. Two hundred and seventy-nine students (males – 180 and females – 99) belonged to the para-medical category, which represents 63.41% of the students pursuing para-medical courses (Physiotherapy and Pharmacy) in the selected colleges.

Table 1. Distribution of the study subjects by course of study and gender

Croup /		Μ		F		Total	
gender		No.	%	No.	%	No.	%
A	1	110	82.7	23	17.3	133	100
	2	101	71.6	40	28.4	141	100
В	3	68	48.9	71	51.1	139	100
	4	112	80.0	28	20.0	140	100
С	5	100	74.6	34	25.4	134	100
	6	86	62.3	52	37.7	138	100
	Total	577	69.9	248	30.1	825	100

A, non-medical; B, para-medical; C, medical; 1, Management; 2, Engineering; 3, Physiotherapy, 4, Pharmacy; 5, Homoeopathy; 6, Ayurveda; M, males; F, females.

A total of 272 students (males – 186 and females – 86) belonged to the medical (Alternate medicine) category, which represents 61.82% of the total number of students pursuing medical undergraduate courses in the colleges (Homoeopathy and Ayurveda) belonging to this category (Table 2).

The mean age (years) of all the students was 19.38 ± 1.57 . The purpose of this study was informed and explained to the students and a written consent was obtained from all the students who were willing to participate in the survey.

A self-administered, structured questionnaire was prepared in English. The pilot survey was conducted on 20 non-medical students and the results confirmed that the questions were simple, unambiguous and easy-to-understand and reply. The questionnaire included 41 items designed to evaluate the oral health knowledge, attitude and behaviour of the students.

1 Source of health information. To know where the students acquired the source of their health information.

2 Oral health knowledge. The assessment of participant's oral health knowledge included 20 questions on the number of sets of dentition, number of milk teeth, number of permanent teeth, purpose of tooth brushing, interval of change of tooth brush, meaning of plaque and its effect on dentition, meaning of gum bleeding and its reasons, methods to prevent gum bleeding, effect of soft/fizzy drinks on teeth, effect of sweet retention, reasons, effect and methods of prevention of tooth decay, effect of fluorides on teeth, causes of oral cancer, reasons for tooth loss in old age, impact of oral health on general health, effect of loss of teeth on speech and knowledge about alignment of crooked teeth.

3 Oral health attitude. Six questions on attitude towards regular dental visits, replacement of missing natural teeth, gutkha

Table 2. Percentage of students who participated from each professional college (sample size)

	Course of study	No. students				
		Total no. enrolled for the course	Partio in the	cipate e surv		
Category			Μ	F	Total	Percentage
A	1	300	110	23	133	44.33
	2	800	101	40	141	17.63
	Total	700	211	63	274	39.14
В	3	200	68	71	139	69.50
	4	240	112	28	140	58.33
	Total	440	180	99	279	63.41
С	5	200	100	34	134	67.00
	6	240	86	52	138	57.5
	Total	440	186	86	272	61.82

A, non-medical; B, para-medical; C, medical; 1, Management; 2, Engineering; 3, Physiotherapy; 4, Pharmacy; 5, Homoeopathy; 6, Ayurveda; M, males; F, females.

chewing/smoking habit, services/care provided by a dentist, attitude towards dental care and body care in general and involvement in the dental treatment.

4 Oral health behaviour. The assessment of participant's oral health behaviour included 14 questions on frequency and time of tooth brushing, material used for brushing teeth, reasons for change of tooth brush, tongue cleaning, use of other oral hygiene aids, reason for visiting a dentist, frequency of consumption of sweets, behaviour on noticing signs of dental caries or periodontal disease and bad habits like gutkha/pan chewing or smoking.

The students were asked to respond to each item according to the response format provided in the questionnaire. The students received a full explanation of how to fill in the questionnaire. The students took an average of 15 min to complete the procedure. Anonymity of the respondents was assured. A health talk was given to the students and their queries were answered after completion of the data collection.

Statistical analysis

For the purpose of analysis, each correct answer was given score 'one' and wrong and don't know answers were given score 'zero' in the items included in knowledge and attitude sections of the questionnaire. In the behaviour section, 'zero' and 'one' scores were given according to the appropriateness of the option selected by the respondent. The data were analysed using the spss version 13.0 software (SPSS Inc., Chicago, IL, USA). The individual scores were summed up to yield a total score. Descriptive statistics were obtained and mean percentage scores, standard deviation and frequency distribution were calculated for the oral health knowledge, attitude and behaviour items.

The Student's *t*-test, ANOVA test and Scheffe's test were applied for the statistical evaluation of means and chi-squared test was used for comparisons of proportions. The linear regression analysis was used to find the relationship in oral health behaviour with knowledge and attitude.

Results

The distribution of the study subjects by course of study and gender is illustrated in Table 1. The number of students from each college participating in the survey represents how much percentage of the total number of students enrolled in that college as shown in Table 2. There was a statistically significant difference in the mean percentage knowledge, attitude and behaviour scores of the students belonging to non-medical, para-medical and medical categories (Table 3). A statistically significant difference in the mean percentage knowledge, attitude and behaviour scores was found among the students in different professional courses (Table 4). The mean percentage knowledge, attitude and behaviour scores were significantly higher for female students compared with their male colleagues (P = 0.000 for all) as shown in Table 5. The knowledge questions in which less than 50% of the students gave the correct response were: number of sets of dentitions, number of milk teeth, meaning of plaque (tarter), what does plaque lead to, reasons for gum bleeding, effect of sweet retention on dentition, reasons for tooth decay, methods to prevent the tooth decay, effect of fluorides on dentition and reasons for tooth loss in old age.

More than 50% of the respondents gave a correct response for the knowledge items regarding the number of permanent teeth, purpose of tooth brushing, methods to prevent gum bleeding, effect of fizzy drinks on teeth, do the decayed teeth affect appearance of a person, reason for development of oral cancer, does the health of mouth impact the health of the body, whether loss of teeth can interfere with speech and possibility to move irregularly placed teeth into correct position. The percentage of correct responses was higher among female students than among male students.

Although not statistically significant in all the items, the percentage of female students giving the correct response knowledge of preventive behaviours, such as purpose of tooth brushing, methods to prevent tooth decay, methods to prevent gum bleeding, effect of sweet retention on dentition, effect of fluorides on dentition and effect of fizzy drinks on teeth was more than their male colleagues. More females than males were aware that tobacco chewing and smoking cause oral can-

Table 3. Assessment and comparison of mean percentage knowledge, attitude and behaviour scores among the students of the non-medical, para-medical and medical categories

		No.	Mean	SD	SE	<i>P</i> -value
KS	А	274	50.73 a	15.96	0.96	0.001**
	В	279	53.62	15.02	0.90	
	С	272	55.42 b	13.75	0.83	
	Total	825	53.25	15.05	0.52	
AS	А	274	69.04 a	22.54	1.36	0.000**
	В	279	79.69 b	19.53	1.17	
	С	272	76.10 b	17.68	1.07	
	Total	825	74.97	20.48	0.71	
BS	А	274	55.16 a	19.06	1.15	0.000**
	В	279	60.78 b	18.80	1.13	
	С	272	61.32 b	17.86	1.08	
	Total	825	59.09	18.77	0.65	

A, non-medical; B, para-medical; C, medical; KS, Knowledge score; AS, Attitude score; BS, Behaviour score.

Test used: ANOVA and Scheffe test. Values with different alphabets differ significantly with P < 0.05; ** $P \le 0.001$.

Table 4. Assessment and comparison of mean percentage
knowledge, attitude and behaviour scores of the students
doing different professional courses

			No.	Mean	SD	SE	P-value
KS	А	1	133	50.00 a	15.34	1.33	0.000**
		2	141	51.42	16.55	1.39	
	В	3	139	57.19 b	13.53	1.15	
		4	140	50.07 a	15.62	1.32	
	С	5	134	54.44	13.36	1.15	
		6	138	56.38 b	14.10	1.20	
		Total	825	53.25	15.05	0.52	
AS	А	1	133	69.67 a1	20.90	1.81	0.000**
		2	141	68.44 a1	24.05	2.03	
	В	3	139	84.29 b1,2	17.46	1.48	
		4	140	75.12 a2	20.44	1.73	
	С	5	134	74.38 a2	17.42	1.50	
		6	138	77.78 b1	17.82	1.52	
		Total	825	74.97	20.48	0.71	
BS	А	1	133	54.51 a	19.37	1.68	0.000**
		2	141	55.78 a	18.80	1.58	
	В	3	139	63.36 b	17.95	1.52	
		4	140	58.21	19.33	1.63	
	С	5	134	61.19	17.87	1.54	
		6	138	61.44	17.91	1.52	
		Total	825	59.09	18.77	0.65	

A, non-medical; B, para-medical; C, medical; 1, Management; 2, Engineering; 3, Physiotherapy; 4, Pharmacy; 5, Homoeopathy; 6, Ayurveda; KS, Knowledge score; AS, Attitude score; BS, Behaviour score.

Test used: ANOVA and Scheffe test. The mean percentage scores with different alphabets differ significantly; ** $P \leq .001$.

Table 5. Assessment and comparison of mean percentage knowledge, attitude and behaviour scores by gender among all students

	Gender	No.	Mean	SD	SE	P-value
KS	1	577	51.53	15.28	1.13	0.000**
	2	248	57.26	13.71		
AS	1	577	72.65	20.96	0.53	0.000**
	2	248	80.38	18.25		
BS	1	577	57.35	18.89	1.41	0.000**
	2	248	63.13	17.88		

1, males; 2, females; KS, Knowledge score; AS, Attitude score; BS, Behaviour score.

Test used: Student's *t*-test; $**P \le 0.001$.

cer, the health of mouth impacts the health of the body, loss of teeth can interfere with speech and it is possible to move irregularly placed teeth into correct position.

More than 50% of the respondents have shown a positive response to all the attitude questions. The percentage of females giving the correct response for the attitude questions was higher than their male colleagues. The behaviour items in which less than 50% of the students have shown a positive response are: frequency of tooth brushing, time of brushing, use of dental floss and frequency of consumption of sweets.

The 'brushing behaviour' showed that only 47.8% of the students brush their teeth twice, i.e. in the morning and after having food and 52.2% of the students brush their teeth only once daily (in the morning). Regarding the material used for brushing, 96.7% of the students used tooth paste with tooth brush and only 3.3% of the students used tooth powder or others with or without tooth brush.

Fluoridated tooth paste was used by 63.2% of the students. The percentage of female students (74.6%) using fluoridated toothpaste was significantly higher than their male colleagues (58.2%) with $P \leq 0.001$. Tongue cleaning was done by 83.8% of the students and 22.7% of the students used dental floss as other oral hygiene aid.

The percentage of students visiting a dentist one or more times was 57.3%, whereas 42.7% of the students have never visited a dentist before. The percentage of visiting a dentist one or more times was significantly high for the female students (66.1%) compared with their male colleagues (53.5%) with P = 0.001. Of the total number who have visited a dentist one or more times, for 56.2% of the students, time since last visit was less than 1 year and 69.7% of them visited the dentist for routine check-up and treatment, whereas 30.3% of the students visiting the dentist less than 1 year ago and for routine check-up was higher among the females than among their male colleagues.

Regarding the consumption of sweets, 30.3% of the students responded that they did not eat sweet at all and 69.7% of the students had sweets one/more times in a day. The percentage of students reporting none of the bad habits like pan chewing/gutkha chewing/cigarette smoking was 90.9% and only 9.1% of the students had one of these habits (data not shown).

Regression analysis

The regression analysis for behaviour on knowledge and attitude in all the students showed that the oral health behaviour of the students has a linear relationship with the attitude of the students (P < 0.001) depicting the influence of attitude, beliefs in moulding the behaviour, but no significant linear relation with the knowledge (P > 0.05) which shows that all the knowledge is not changed into behaviour.

Discussion

Keeping in mind the expected role to be played by the student community on the whole in affecting a behavioural change in the society, a need was felt for assessing the oral health-related knowledge, attitude and behaviour of different professional college students. Oral hygiene is fundamental to the maintenance of oral health; therefore, oral hygiene knowledge and practice were taken as primary data for comparison. This study presented a comprehensive overview of oral health knowledge, attitude and behaviour of professional college students in Udaipur city, Rajasthan, India.

The methodological strength of present study is the large sample size, the sampling strategy and the diverse nature of oral health behaviours. The limitations of the present study include the lack of standard questionnaire for assessing the oral health knowledge, attitude and behaviour and the non-availability of comparable study instrument. As the results of present study related to oral health knowledge, attitude and behaviour rely on self-reported data, the rates of oral health behaviour may be biased through over- and under-reporting due to social desirability.

In present study, it was found that the level of knowledge was quite low among the professional students, with less than 50% of the students having correct knowledge about the sets of dentition we have; number of milk teeth; the reasons for gum bleeding, dental decay and loss of teeth in old age; the methods to prevent dental decay and the preventive role of fluorides in toothpaste. Although more than 50% of the students showed positive attitude towards dental care, less than 50% of the students showed positive oral health behaviour related to frequency of tooth brushing, time of brushing, use of dental floss and frequency of sweet consumption.

Observations from the present study suggest that the population group of present study has attitudes favourable for regular visits to a dentist, which is similar to studies from developed countries (23, 24). This may be attributed to more favourable socioeconomic and educational factors. Although the mean percentage behaviour scores were more than 50% in all the students, certain 'preventive behaviours' like twice daily brushing, dental floss use, reduction in sweet consumption, etc. were not adequate, which reflects lack of knowledge among the students.

As was expected, the level of oral health knowledge, attitude and behaviour was higher in the medical and para-medical students compared with that of the non-medical students, because it is an important content in their professional education, and they need this knowledge to educate patients and community when they start working in healthcare system and as being the healthcare personnel, their attitude not only affects their own oral health behaviour but also potentially influences the health behaviour of the patients and community.

In general, the medical students showed the highest knowledge, attitude and behaviour scores with a statistically significant difference as compared with the non-medical students $(P \le 0.001 \text{ for all})$; and the para-medical student showed higher knowledge, attitude and behaviour scores compared with nonmedical students (P < 0.001 for attitude and P < 0.05 for behaviour) unlike the results of a study by Prasad et al. (25) in which the medical professional students showed significantly higher knowledge and attitude scores (P < 0.01 for both) followed by Pharmacy, Law, Engineering and Agriculture students, but the Pharmacy students had significantly higher behaviour scores (P < 0.01) compared with Law, Agriculture, Engineering and Medical professionals. In another study by Doshi et al. (1), there was no significant difference in the usage of fluoridated tooth paste usage, tongue cleaning, mouth rinsing after meals and dental service utilization among the medical and engineering students, but the brushing after every meal and the dental floss use were significantly higher among the medical students than among the engineering students (P < 0.001) for both.

Consistent with the results of some previous studies, such as Lim *et al.* (26), Schwarz (27), Fukai *et al.* (28), Kawamura *et al.* (29), Ostberg *et al.* (30), Polychronopoulou *et al.* (31), Al-Omari and Hamasha (32) and Pellizzer *et al.* (33). In general, females showed significantly higher oral health knowledge, attitude and behaviour scores compared with male students ($P \le 0.001$). In contrast to the results of the present study, there was no gender difference in the knowledge, attitude and behaviour of the senior Iranian dental students in a study by Khami *et al.* (2007) (34).

Oral hygiene practices in India are deeply rooted in tradition and culture with use of indigenous substances being widely prevalent (35). The present study revealed that 96.7% of the students used tooth paste and tooth brush to clean their teeth. The percentage was less compared with that of the medical and engineering students (100%) in a study by Doshi *et al.* (1) and was more compared with that in a study by Maatouk *et al.* (36) among Tunisian dental students.

In the present study, the percentage of students brushing twice daily (47.8%) was lower compared with the dental students in a study by Maatouk *et al.* (36), the dental students in a study by Al-Mashhadani and Hashim (37) and the Kuwaiti adults in a study by Al-Shammari *et al.* (38).

Dental health behaviours have been categorized according to 'brushing behaviour', 'complex dental behaviour' and 'sugar behaviour' by Rise and Holund (39). The effective toothcleaning practices are indicative of positive oral health behaviour, whereas frequent consumption of sugary foods represents negative health behaviour (risk behaviour) (40). In the present study, there was no statistically significant difference in brushing behaviour of males and females consistent with the study by Tseveenjav *et al.* (41) among the Mongolian dental students. This finding does not agree with the results of studies by Al-Omari and Hamasha (32), Khami *et al.* (42), Kassak *et al.* (43) among new undergraduate students in Lebanon, Khalid *et al.* (44) among dental students, Maatouk *et al.* (36), Pellizzer *et al.* (33) and a study by Khami *et al.* (34) where females brushed their teeth more often than males.

Although the knowledge about the effect of fluoride on the dentition was poor (29.8%), the students showed high fluoridated tooth paste use (63.2%). This portrays the effect of factors other than knowledge, like, beliefs, values, attitudes, influence of family members and friends on the oral health behaviour. The knowledge about the effect of fluorides on dentition was poor compared to the of the students in a study by Al-Ansari *et al.* (45), but the fluoridated toothpaste use was higher compared with the Chinese urban adolescents in a study by Jiang *et al.* (46).

While oral hygiene procedures are known to reduce quantities of oral bacteria and available substrate sugars, the use of fluoride containing dentifrices is believed to be most responsible for caries prevention (47). Consistent with the findings of the two studies by Khami *et al.* (34, 42) among the senior Iranian dental students where women reported significantly higher fluoridated toothpaste use and compared with men, in present study, females showed better behaviour related to use of fluoridated toothpaste than the male students.

Health-related behaviour change would reduce unhealthy behaviours such as sugar in the diet and smoking, and increase healthy behaviours such as flossing and dental attendance by Prochaska (48). In present study, 22.7% of the students used dental floss as an oral hygiene aid. The percentage was much higher than that of Kuwaiti adults in a study by Al-Shammari *et al.* (38) and that of the dental students in a study by Maatouk *et al.* (36). Although not statistically significant, the dental floss usage was more in females than in males, consistent with previous study by Al-Omari and Hamasha (32) and Khami *et al.* (34) among Iranian dental students.

Many general health factors are of direct relevance to oral health, e.g. smoking, diabetes, alcohol, stress, medication studied by Horowitz (49). The percentage of students indulging in any one of the bad habits like pan/Gutkha chewing and cigarette smoking was less (9.1%) in the present study compared with the high school students in a study by Fisher *et al.* (50), the dental students in a study by Malbrunot (51), the Tunisian medical students in a study by Fakhfakh (52) and the dental students in a study by Maatouk *et al.* (36).

In the present study, the percentage of males indulging in the bad habits like smoking, pan chewing or gutkha chewing was significantly higher than females. This finding agrees with the studied by Almas *et al.* (44) and Al-Omari and Hamasha (32) among the dental students in Jordan. The prevalence of smoking was greater in males in a study by Maatouk *et al.* (36) as was also shown by Ghannem *et al.* (53) and WHO report, which reported males constituting 70% smokers in the world (54).

Although long-term studies have shown strong correlation between good oral self-care and low caries rates, dietary sugars have been more strongly correlated with dental caries than poor oral hygiene (55–57). In present study, percentage of sugar consumption was higher among females than their male colleagues, in contrast with the results of a study by Astrom and Masalu (58) among Tanzanian university students.

Previous studies have shown that mass media, dental professionals and dental literature are the main sources of oral health information (14). In the present study, the sources of information were magazines/books, physician's office/health clinics, family members, radio/television, dental professionals, newspapers and peers, in descending order.

In the present study, 74.7% of the students said that regular visit to a dentist is necessary, whereas only 57.3% have actually visited a dentist before. This shows that although they had knowledge and attitude, all the knowledge was not changed into behaviour. The percentage of students who have never visited a dentist was high in the present study (42.7%) compared to the dental students in Jordan in a study by Al-Omari and Hamasha (32).

Visiting the dentist for routine check-up was defined as 'preventive care use'. In the present study, 69.7% of the students visited the dentist for routine check-up and for 30.3%, dental pain or swelling was the driving factor. In contrast with the results of the present study, for 50% of the dental students in Jordan in a study by Al-Omari and Hamasha (32), tooth ache was the main reason for dental visit. The main reason for dental visit was reported to be toothache in another study by Doshi *et al.* (1).

The percentage of students visiting a dentist for a routine check-up was higher among females than among their male colleagues. This could be explained on the basis that females usually care more about their body and appearance. They would thus be more concerned about visiting the dentist. This finding agrees with the result of the study by Astrom *et al.* (58) among Tanzanian university students, where dental attendance behaviour were higher among females.

Results of the present study showed a statistically significant linear relationship of oral health behaviour with the attitude of the students (P < 0.001) depicting the influence of attitude, beliefs in moulding the behaviour, but no significant linear relationship with the oral health knowledge (P > 0.05). This finding was similar to that of Steptoe *et al.* (12) and Astrom (59) who stated that although oral health knowledge is considered an essential prerequisite for health-related behaviour, only a weak association seems to exist between knowledge and behaviour.

In sum, these results indicate that the 'oral health knowledge' was not enough to influence the 'oral health behaviour', but the behaviour was dependent on 'attitude' of the students, which means that a positive attitude and adherence to good oral hygiene behaviours lead to a better overall oral health.

The scientific literature offers conflicting results on the impact of the oral health knowledge, attitude and oral health behaviour on the oral disease. However, collection of such data has been helpful in planning preventive oral health education programme. There is scarcity of data regarding dental healthcare attitudes in Indian setting. To develop a sound strategy for improving dental and oral health of Indian population, more representative data base should be made available. For this, additional studies are needed using reliable and indigenously developed attitudinal scales.

Conclusion

It may be concluded that the oral health knowledge among the non-medical, para-medical and medical students was considerably lower than what would be expected of these groups, which had higher literacy levels, but they showed a positive attitude towards oral health and dental professionals. Attitudes are not learnt from text books, but they are acquired by social interaction and hence the responsibility to develop healthy attitudes depends upon parents, teachers, religious leaders and elders in the society. The oral health behaviour of the students was dependent on the attitude, but did not show a linear relationship with the oral health knowledge, indicating that knowledge was not enough to influence the oral health behaviour of the students. Although the behaviour scores of the students were better than the knowledge scores, the preventive behaviour among the students could still be improved.

Therefore, we suggest and recommend that oral health awareness among these students should be increased for which the oral health professionals working collectively need to support the development of a 'sound strategy'. Oral health education and programmes targeting the young adult population in the society would help mould their attitude and oral health behaviour for attaining a good oral health and health of the community in general.

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