

# Relationship of Periodontal Status and Dental Caries Status with Oral Health Knowledge, Attitude and Behavior among Professional Students in India

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## Abstract

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**Aim** To find the relationship of periodontal status and dental caries status with oral health knowledge, attitude, behavior, among professional students in India.

**Methodology** In a cross sectional study, a total of 825 students (males: 577, females: 248) from six professions were surveyed using a self administered structured questionnaire including 41 multiple choice questions and the WHO Oral Health Assessment Form (1997). The data was analyzed using the SPSS version 13.0 to perform the Student's *t*-test, ANOVA test, Scheffe's test and Chi-square test, linear regression analysis.

**Results** The mean percentage scores of the students for

knowledge were  $53.25 \pm 15.05$ ; for attitude  $74.97 \pm 20.48$ ; and for behavior  $59.09 \pm 18.77$ . The percentage of students with calculus score was found to be significantly high (43.8%). The percentage of professional students with DMFT > 4 was 14.1% and the percentage of students with decayed teeth was 46.2%. The regression analysis showed that the oral health behavior of the students was dependent on the attitude ( $P < 0.001$ ), but showed no significant linear relation with the knowledge. Also, that the mean DMFT score was dependent on the oral health behavior ( $P < 0.05$ ), but showed no significant relationship with the knowledge and attitude of the students. The periodontal status was independent on the knowledge, but showed a significant relationship with attitude and behavior of the students.

**Conclusion** A positive attitude and adherence to good oral hygiene behaviors is associated with better oral health.

**Keywords** oral health knowledge, attitude, oral health behavior, professional students

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## Introduction

Health is a valuable asset not only for an individual, but also for the social system. A nation may progress more rapidly when the population are healthier and lead a productive life. "Public health is the coalition of professions united by their shared mission" (Institute of Medicine Committee for the study of the future public health, Division of Health Care Services, 1988). The phrase "coalition of professions" stresses that the achievement of better public health requires more

than the participation of the various health professions: public health individuals and groups band together to achieve a common goal (Block et al., 2003).

Oral health is now recognized as equally important in relation to general health. Various factors like nutritional status, tobacco smoking, alcohol, hygiene, stress, etc. are linked to a wide range of oral diseases forming the fundamental basis of the common risk factor approach (WHO, 2000) to prevent the oral diseases (Sheiham et al., 2000). Among these, oral hygiene is the most significant

factor in terms of prevention of oral diseases. The oral health concern of an individual is dependent on the attitude of a person. These attitudes naturally reflect their own experiences, cultural perceptions, familial beliefs, and other life situations and strongly influence the oral health behavior (Friedman *et al.*, 1976; Wright, 1982; McCaul *et al.*, 1985; Chen 1986).

The broad categories of factors that may influence individual and community health behavior 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 (Park, 2005). Those who have assimilated the knowledge and feel a sense of personal control over their oral health are more likely to adopt self-care behavior (Freeman *et al.*, 1993). The goal of oral health promotion is — knowledge to be shared with members outside the dental profession.

Among common oral diseases, caries and periodontal diseases are the two foremost oral pathologies that remain widely prevalent and affect all populations throughout the life span (Barnes, 1999). The risk behaviors for dental caries and periodontal disease include frequent intake of sugary foods and drinks, irregular tooth brushing, smoking, alcohol consumption and irregular dental attendance (Levine *et al.*, 2001). These risk behaviors 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 (Berndt, 1982; Hopkins, 1994; Maxwell, 2002) with personal responsibility for preventing dental disease beginning at this age and determining future oral health (Honkala, 1995; Peterson, 1988). Therefore, assessing the oral health awareness, periodontal status and dental caries status of young adult becomes essential. One group from the population that could be easily used for this purpose is the professional college students.

Several recent studies reveal the oral health attitudes and behaviors of young adult and the relation between their attitudes and behaviors and their dental and oral status (Kawamura *et al.*, 1993; Holanka, 1995). Oliveria *et al.* reported that children without adequate oral health knowledge are twice as likely to have caries than those with adequate

knowledge (Oliveria *et al.*, 2000).

To date, information is limited regarding the public's knowledge and attitude about oral diseases and their prevention. With a higher education background the concept of prevention and well-being could be more easily understood by people, irrespective of their course of study. So the present study was conducted to assess the oral health knowledge, attitude, behavior, the periodontal status and dental caries status of professional college students.

## Materials and methods

### Sampling design

An epidemiological survey was conducted from December 2007 to February 2008. A staged simple random sampling method was used to select six different professional colleges (Management, Engineering, Physiotherapy, Pharmacy, Homeopathy and Ayurveda) in Udaipur City. From the total number of students pursuing the undergraduate course of studies in each of the selected colleges, all the available students who agreed to participate in the survey were selected, which gave a sample size of 825 subjects (Table 1). The mean age of all the students (in years) was  $19.38 \pm 1.57$ .

### Official permission

Before the start of the survey official permission was obtained from the corresponding authorities and an ethical approval was obtained from the ethical committee.

### Survey proforma

The survey proforma was prepared with the help of a self administered structured questionnaire written in English to assess the oral health knowledge, attitude and behavior of the students and WHO Oral Health Assessment Form (1997) to assess the dental caries status and periodontal status of the students.

The questionnaire was validated through a pilot survey, included 41 items (One question on source of health information, twenty questions on oral

**Table 1** Distribution of the study subjects by course of study and gender and percentage of students that participated from total number enrolled in each professional college (sample size)

Category	Course of study	No. of students				Percentage of total no. participated /%
		Total no. enrolled for the course	No. participated in the survey			
			M (%)	F (%)	Total (%)	
A	1	300	110 (82.7)	23 (17.3)	133 (100)	44.33
	2	400	101 (71.6)	40 (28.4)	141 (100)	35.25
B	3	200	68 (48.9)	71 (51.1)	139 (100)	69.50
	4	240	112 (80.0)	28 (20.0)	140 (100)	58.33
C	5	200	100 (74.6)	34 (25.4)	134 (100)	67.00
	6	240	86 (62.3)	52 (37.7)	138 (100)	57.50
Total		1,580	577 (69.9)	248 (30.1)	825 (100)	52.22

A: Non-Medical, B: Para-Medical, C: Medical. 1: Management, 2: Engineering, 3: Physiotherapy, 4: Pharmacy, 5: Homeopathy, 6: Ayurveda.

M: Males, F: Females.

health knowledge, six questions on oral health attitude and fourteen questions on oral health behavior) designed to evaluate the oral health knowledge, attitude and behavior of the students (Zhu *et al.*, 2003).

The dental caries status was recorded from the dentition status and treatment needs as described by WHO (1997). The periodontal status was recorded by using the CPI scores as described by WHO (1997).

## Methodology

All the students in the selected professional colleges were invited to participate in the survey. The purpose of the study was informed and explained to the students. Those who voluntarily agreed to participate in the survey and gave a written consent for the same, were asked to respond to each item according to the response format provided in the questionnaire. The students took an average of 15 minutes to complete the procedure. Anonymity of the respondents was assured.

The oral examination of the students was conducted simultaneously under natural light. The examination of dental caries and periodontal status was made using the Community Periodontal Index probe and a mouth mirror. On an average it took 5

to 6 minutes to complete the oral examination of each student. All the instruments were autoclaved daily.

## Statistical analysis

Scoring was done and the data was analyzed using the Statistical Package for Social Sciences version 13.0 software. 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 behavior items.

The periodontal index scores and dental caries scores were computed according to WHO recommendations (WHO, 1997). The prevalence proportion rates and mean values and standard deviation were calculated for the purpose of analysis.

The Student's *t*-test, ANOVA test and Scheffe's test were applied for the statistical evaluation of means and Chi-square test was used for comparisons of proportions. The linear regression analysis was used to find the relation of oral health behavior with the knowledge and attitude and to find whether the dental caries status is dependent on the oral health knowledge, attitude and oral health behavior of the students. Level of significance was set at 0.05 and 0.001.

## Results

### Sample size

A total of 825 students (males: 577, females: 248) participated in the survey. For the purpose of discussion and comparison all the different professions were categorized into three different categories (depending on their course of study) such as Non-Medical, Para-Medical and Medical. The percentage of students participated from each professional college (sample size) and the distribution of the study subjects by course of study and gender is shown in Table 1.

### Source of health information

The distribution of students according to the source of health information is given in Table 2.

**Table 2** Percentage of students with different source of health information

Source of health information	Percentage /%
Dental clinic	12.4
Physician's office	17.5
Family members	15.8
Friends/Neighbours	6.7
Radio/Television	15.6
News paper	11.6
Magazine/Books	20.5

### Oral health knowledge, attitude and behavior

As shown in Table 3, the knowledge scores were significantly higher for the students in Medical category ( $55.42 \pm 13.75$ ) compared to the Non-Medical category ( $50.73 \pm 15.96$ ). Whereas, there was no statistically significant difference in the knowledge scores between the Medical and Para-Medical categories. Overall, the knowledge scores were highest for the students in the Medical category.

The attitude scores were significantly lower for the Non-Medical category ( $69.04 \pm 22.54$ ) compared to the other two categories. There was no statistically significant difference between the attitude scores of the students in the Medical and Para-Medical categories. Para-Medical category students

**Table 3** Assessment and comparison of mean percentage knowledge, attitude and behavior scores among the professional students

	No.	Mean	SD	P	
KS	A	274	50.73 (a)	15.96	0.001**
	B	279	53.62	15.02	
	C	272	55.42 (b)	13.75	
	Total	825	53.25	15.05	
AS	A	274	69.04 (a)	22.54	0.000**
	B	279	79.69 (b)	19.53	
	C	272	76.10 (b)	17.68	
	Total	825	74.97	20.48	
BS	A	274	55.16 (a)	19.06	0.000**
	B	279	60.78(b)	18.80	
	C	272	61.32 (b)	17.86	
	Total	825	59.09	18.77	

A: Non-Medical, B: Para-Medical, C: Medical. KS: Knowledge score, AS: Attitude score, BS: Behavior score. Test used - ANOVA and Scheffé test. a and b: Means with different alphabets differ significantly with  $P < 0.05$ . \*\*:  $P \leq 0.001$ .

showed highest attitude scores ( $79.69 \pm 19.53$ ).

The behavior scores were significantly lower for the students in Non-Medical category ( $55.16 \pm 19.06$ ) compared with the students in the Para-Medical and the Medical categories. Though there was no statistically significant difference in the behavior scores of the students in the Medical and Non-Medical categories, the scores were highest for the Medical category students ( $61.32 \pm 17.86$ ).

The knowledge, attitude and behavior scores were significantly higher for female students compared to their male colleagues, as shown in table 6.

### Periodontal status

Table 4 shows that the mean number of sextants with healthy periodontium did not show a statistically significant difference in Non-Medical, Para-medical and Medical categories.

The mean number of sextants with bleeding on probing was significantly higher for the Non-Medical category ( $1.48 \pm 1.61$ ) compared to the Para-Medical ( $1.17 \pm 1.45$ ) and Medical categories ( $1.01 \pm 1.28$ ). No statistically significant difference was found in the mean number of sextants with bleeding on probing between the Para-Medical and Medical categories.

**Table 4** Assessment and comparison of mean number of sextants with different CPI scores among the professional students

		No.	Mean	SD	P
S0	A	274	3.69	2.17	0.251
	B	279	3.99	2.19	
	C	272	3.76	2.27	
	Total	825	3.81	2.21	
S1	A	274	1.48 (a)	1.61	0.001**
	B	279	1.17 (b)	1.45	
	C	272	1.01(b)	1.28	
	Total	825	1.22	1.46	
S2	A	274	0.83 (a)	1.20	0.001**
	B	279	0.84 (a)	1.30	
	C	272	1.22 (b)	1.67	
	Total	825	0.96	1.41	

A: Non-Medical, B: Para-Medical, C: Medical. S0: Healthy score, S1: Bleeding score, S2: Calculus score. Test used – ANOVA and Scheffe test. a, b: The mean values with different alphabets differ significantly. \*\*:  $P \leq 0.001$ .

The mean number of sextants with calculus was significantly higher for the Medical category ( $1.22 \pm 1.67$ ) compared to the Non-Medical and Para-medical categories. There was no statistically significant difference between the mean number of sextants with calculus for the students in the Non-Medical and Para-Medical categories.

The percentage of students with healthy periodontium was 36.8% ( $n=304$ ), with bleeding on probing was 19.4% ( $n=160$ ) and with calculus was 43.8% ( $n=361$ ) (Data not shown).

As shown in Table 6, there was no statistically significant difference in the mean number of sextants with score healthy periodontium, bleeding and calculus in males and females.

### Dental caries status

As shown in Table 5, the decayed teeth (DT) score was a major component in the DMFT score and the mean number of decayed teeth was highest for the Non-Medical category ( $1.41 \pm 1.68$ ) and was lowest for the Para-Medical category ( $1.12 \pm 1.68$ ).

The mean number of filled teeth was highest for the Para-Medical category ( $1.14 \pm 0.56$ ) and was lowest for the Medical category ( $0.09 \pm 0.32$ ).

The mean number of teeth missing due to caries

was highest for the Para-Medical category ( $0.04 \pm 0.24$ ) and was lowest for the Medical category ( $0.02 \pm 0.15$ ).

The mean DMFT score was highest for the Non-Medical category ( $1.53 \pm 1.75$ ) and lowest for the Medical category ( $1.28 \pm 1.90$ ).

The total percentage of students with dental caries was 46.2%, with filled teeth was only 7.2%, with teeth missing due to caries was 2.5% and with DMF score more than 4 was 14.1% in all (Data not shown).

The mean number of decayed teeth was significantly higher in male students compared to female students whereas there was no statistically significant difference in the mean number of filled teeth, teeth missing due to caries and the DMFT score in both the sexes, as demonstrated in Table 6.

**Table 5** Assessment and comparison of mean number of decayed teeth, teeth missing due to caries, filled teeth and mean DMFT scores among the professional students

	Group	No.	Mean	SD	P
DT	A	274	1.41	1.68	0.110
	B	279	1.12	1.68	
	C	272	1.17	1.85	
	Total	825	1.23	1.74	
MT	A	274	0.03	0.19	0.585
	B	279	0.04	0.24	
	C	272	0.02	0.15	
	Total	825	0.03	0.20	
FT	A	274	0.09	0.39	0.274
	B	279	0.14	0.56	
	C	272	0.09	0.32	
	Total	825	0.11	0.44	
DMFT	A	274	1.53	1.75	0.212
	B	279	1.30	1.85	
	C	272	1.28	1.90	
	Total	825	1.37	1.84	

A: Non-Medical, B: Para-Medical, C: Medical. DT: Decayed teeth, MT: Teeth missing due to caries, FT: Filled teeth, DMFT: DT+MT+FT. Test used – ANOVA.

### Relationship of periodontal and dental caries status with knowledge, attitude and behavior

As shown in Table 7, the oral health behavior of the students has a linear relationship with the attitude of the students depicting the influence of

**Table 6** Assessment and comparison of mean percentage knowledge, attitude and behavior scores, mean number of sextants with different CPI scores and mean number of decayed teeth, teeth missing due to caries, filled teeth and mean DMFT scores by gender

Sex	No.	Knowledge, attitude & behavior scores			CPI Scores			Dental caries scores					
		Mean	SD	P	Mean	SD	P	Mean	SD	P			
M	577	KS	51.53	15.28	0.000**	S0	3.77	2.18	0.41	DT	1.32	1.79	0.023*
F	248		57.26	13.71			3.91	2.28			1.02	1.60	
M	577	AS	72.65	20.96	0.000**	S1	1.24	1.44	0.48	MT	0.03	0.18	0.340
F	248		80.38	18.25			1.17	1.51			0.04	0.23	
M	577	BS	57.35	18.89	0.000**	S2	0.98	1.38	0.60	FT	0.10	0.40	0.622
F	248		63.13	17.88			0.92	1.49			0.12	0.52	
M										DMFT	1.45	1.88	0.054
F											1.18	1.74	

KS: Knowledge score, AS: Attitude score, BS: Behavior score. S0: Sound score, S1: Bleeding score, S2: Calculus score. DT: Decayed teeth, MT: Teeth missing due to caries, FT: Filled teeth, DMFT: DT+MT+FT. Test used – Student T-test. \*:  $P \leq 0.05$ , \*\*:  $P \leq 0.001$ .

attitude, beliefs in molding the behavior, but no significant linear relation with the knowledge which shows that knowledge was not enough to influence the behavior.

**Table 7** Regression analysis: for oral health behavior on oral health knowledge and attitude

	Df	Mean square	P
Regression	2	21236.585	0.000**
Residual	822	301.350	
Total	824		

$r^2 = 0.15$ .

	Coefficients	Std. error	P
Intercept	30.272	2.731	0.000**
KS	0.084	0.043	0.051
AS	0.325	0.031	0.000*

Dependent variable: BS. KS: Knowledge score, AS: Attitude score, BS: Behavior score. \*:  $P \leq 0.05$ , \*\*:  $P \leq 0.001$ .

Table 8 shows the mean percentage knowledge, attitude and behavior scores of the students with different periodontal status (CPI scores – healthy, bleeding and calculus).

There was no significant difference in the mean percentage knowledge scores of the students with CPI scores – healthy, bleeding and calculus, whereas the students with CPI score 1 (bleeding) and CPI score 2 (calculus) showed a statistically significant difference in the mean percentage attitude and behavior scores. The students with CPI score 2 showed a significantly lower mean percentage attitude scores compared to the students with CPI

score 0. The mean percentage behavior score was lowest for students with CPI score 2 ( $55.28 \pm 18.63$ ) and showed a statistically significant difference on comparison with students having CPI score 0 and CPI score 1.

As demonstrated in Table 9, the regression analysis for mean DMFT score on knowledge, attitude and behavior in all the students showed that the mean DMFT score of the students was dependent on the oral health behavior depicting the influence of oral hygiene practice, but no

**Table 8** The mean percentage knowledge, attitude and behavior scores of the students with mean number of sextants having different CPI scores

		No.	Mean	SD	P
KS	S0	304	51.63	14.83	0.062
	S1	159	54.40	15.88	
	S2	360	54.08	14.80	
	Total	823	53.24	15.06	
AS	S0	304	78.29 (a)	19.15	0.000**
	S1	159	76.21	21.42	
	S2	360	71.57 (b)	20.72	
	Total	823	74.95	20.50	
BS	S0	304	63.02(a)	17.74	0.000**
	S1	159	59.88 (a)	19.30	
	S2	360	55.28 (b)	18.63	
	Total	823	59.03	18.74	

KS: Knowledge score, AS: Attitude score, BS: Behavior score. S0: Sound score, S1: Bleeding score, S2: Calculus score. Test used – ANOVA and Scheffe test. a, b: The mean values with different alphabets differ significantly. \*\*:  $P \leq 0.001$ .

**Table 9** Regression analysis: for total DMFT on oral health knowledge, attitude and behavior

	Df	Mean square	P
Regression	3	9.370	0.040*
Residual	821	3.359	
Total	824		

$r^2 = 0.010$ .

	Coefficients	Std. error	P
Intercept	1.351	0.309	0.000**
KS	0.008	0.005	0.090
AS	0.002	0.004	0.592
BS	-0.009	0.004	0.015*

Dependent variable: DMFT. KS: Knowledge score, AS: Attitude score, BS: Behavior score. \*:  $P \leq 0.05$ , \*\*:  $P \leq 0.001$ .

significant relationship with the knowledge and attitude of the students.

## Discussion

This study presented a comprehensive overview of oral health knowledge, attitude, behavior, periodontal status and the dental caries status of professional college students in Udaipur city, Rajasthan. Though the students showed a positive attitude, certain “preventive behaviors” such as twice daily brushing, dental floss use, reduction in sweet consumption *etc.* were not adequate, which reflects a low level of knowledge among the students.

As was expected, the Medical students had the highest knowledge, attitude and behavior scores. The oral health knowledge, attitude and behavior was significantly higher in the Medical and Para-Medical students compared to the Non-Medical students, perhaps 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 health care system. As being the health care personnel their attitude not only affects their own oral health behavior but also potentially influence the health behavior of the patients and community.

In agreement with the results of Polychronopoulou *et al.* (2002), in general females students showed significantly higher oral health knowledge, attitude and behavior scores compared to the male students. In agreement with the results of some previous studies (Kawamura *et al.*, 1993; Lim *et al.*,

1994; Schwarz, 1994; Fukai *et al.*, 1995; Ostberg *et al.*, 1999; Kawamura *et al.*, 1999; Al-Omari *et al.*, 2005; Pellizzer *et al.*, 2007), the present study proved that females generally have better oral health behavior than males. Past discussions of similar findings have suggested that they result both from a greater interest in health among women and from greater social pressure on women to be physically attractive (Rakowski *et al.*, 1990; Ronis *et al.*, 1993; Langlie, 1977). In contrast to the results of the present study there was no gender difference in the knowledge, attitude and behavior of the senior Iranian dental students in a study by Khami *et al.* (2007).

Previous studies have shown that mass media, dental professionals, and dental literature are the main sources of oral health information (Paik *et al.*, 1994). In the present study the sources of information were magazines/books, Physician’s office/health clinics, family members, Radio/television, dental professionals, news papers and peers in descending order.

In the present study, the mean number of healthy sextants per person was found to be higher than that found among Jordanian adolescents (Taani, 1995), among the Iranian adolescents (Sanei *et al.*, 2005) and found in a study among 12–16 year old children in Bangalore district (Manjunath *et al.*, 2007).

In the present study, the mean number of sextants with bleeding on probing, with calculus and shallow and deep pockets (none), were less compared to those found in the Jordanian adolescents (Taani, 1995) and 12-16 year old children in a study by Manjunath *et al.* (2007).

The percentage of students with healthy periodontium, found in the present study, was less compared to the Jordanian adolescents (Taani, 1995), the fourth and fifth year dentistry students in a study by Stypułkowska *et al.* (2003), the 20-29 year old adults in northern Jordan (El-Qaderi, 2004), or the undergraduate dental students in a study by Mathur *et al.* (2008).

In the present study, the percentage of students with healthy periodontium was high, compared to the urban employees in Japan (Kawamura *et al.*, 1993), the children in a study by Christensen *et al.* (2003), the Iranian adolescents (Saanei *et al.*, 2005), and the 12-16 year old children in a study by

Manjunath *et al.* (2008).

In the present study the percentage of CPI score for bleeding, calculus and pockets were lower compared to the Iranian adolescents (Sanei *et al.*, 2005), and lower than in the undergraduate dental students in a study by Mathur *et al.* (2008).

The percentage of CPI score for bleeding and calculus, found in the present study was more compared to the fourth and final year dentistry students in a study by Stypułkowska *et al.*, in whom the percentage was lower for both bleeding and calculus (Stypułkowska *et al.*, 2003).

The percentage of students with calculus was found to be significantly high (43.8%) in the present study. In another study (Peng *et al.*, 1997), about 65% of the urban Chinese children had CPITN maximum score 2 (gingival bleeding and calculus).

In the present study, shallow and deep pockets were not found in any of the subjects unlike those found among urban employees in Japan (Kawamura *et al.*, 1993) and the Jordanian adolescents (Taani, 1995).

In contradiction to the results of some previous studies (Ashraf-Sadat Sanei and Alireza Nikbakht-Nasrabadi, 2005; US department of Health and Human services, National centre for health statistics, 1997) no statistically significant difference was found in the mean number of sextants with healthy, bleeding and calculus score; for males and females.

The mean DMFT score per person, found in the present study was lower compared to the fourth and fifth year dentistry students in a study by Stypułkowska *et al.* (2003), the children in a study by Christensen *et al.* (2003), the young Israeli adults (Levin *et al.*, 2004), the adolescent's in two Hungarian Cities (Madlena *et al.*, 2000), whereas the mean DMFT score was found to be higher compared to the urban Chinese children (Peng *et al.*, 1997) and the school children in a study by David *et al.* (2005).

In agreement with the results of some previous studies (David *et al.*, 2005; Peng *et al.*, 1997), in the present study the DT score dominated the DMFT score among the students, indicating a high rate of unmet treatment needs.

In agreement with the results of a recent study (Mathur *et al.*, 2008) among the undergraduate dental students, in the present study the DT com-

ponent of DMFT score was significantly higher in female students compared to their male colleagues and the mean DMFT score did not show a statistically significant difference among them. This finding is in contradiction to previous surveys in which females have usually demonstrated higher DMF scores than males of the same age (Public Health Service, National Centre for Health Statistics, 1971; US Public Health Service, National Institute of Dental Research, 1987).

Results of the present study showed a statistically significant linear relationship of oral health behavior with the attitude of the students depicting the influence of attitude, beliefs in molding the behavior, but no significant linear relation with the oral health knowledge. This finding was similar to that of Freeman *et al.* (1993) and Astrom (2002), who stated that though oral health knowledge is considered to be an essential pre-requisite for health related behavior but only weak association seems to exist between knowledge and behavior.

The result that the periodontal and dental caries status was independent on oral health knowledge, was in agreement with the results of a study by Kawamura *et al.* (1993).

In the present study, the students with healthy periodontal status had significantly higher attitude and oral health behavior than students with either bleeding or calculus. The regression analysis showed that the mean DMFT scores were dependent on the oral health behavior of the students depicting the influence of oral hygiene practices in the dental caries status.

These results are in agreement with the findings from previous research documenting a positive association between preventive oral behaviors and oral health status (Tedesco *et al.*, 1992; Tedesco *et al.*, 1993; Lang *et al.*, 1994; Lang *et al.*, 1995; Boehmer *et al.*, 1999; Levin *et al.*, 2004; Michiko *et al.*, 2005; Spalj *et al.*, 2006). The limitation of the present study is that the results related to oral health knowledge, attitude and behavior rely on self reported data, the rates of oral health behavior may be biased through over and under reporting due to social desirability.

In summary, these results indicate that the "oral health knowledge" was not enough to influence the "oral health behavior", but the behavior was dependent on the "attitude" of the students. Results also



indicate that oral health attitude and behavior were the predictors of periodontal and dental caries status of the students, but the oral health knowledge did not show a positive correlation with the oral health status. This means that a positive attitude and adherence to good oral hygiene behaviors leads to better overall oral health through reduction in dental caries and periodontal disease.

## Conclusion

It may be concluded that the oral health knowledge among the professional college 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. The oral health behavior of the students was dependent on attitude but did not show a linear relationship with the oral health knowledge.

The results indicate that the oral health knowledge was not enough to influence the oral health status, but attitude and oral health behavior had an influence on the dental caries and periodontal status of the students.

So oral health awareness among these students should be increased for which the health professionals working collectively need to support the development of a “sound strategy”.

Oral health education and motivation of people to adopt healthy behaviors would play a most important role in order to control oral disease. The oral health educational and motivational needs described in this study exist in many developing countries. While this study examined the oral health knowledge, attitude and behavior; the periodontal and dental caries status of professional students, more detailed studies probing these issues in depth are needed in different target populations. There is scarcity of data regarding oral health care attitudes in Indian. To develop a sound strategy for improving dental and oral health of Indian population, a more representative data base should be made available. For this, additional studies are needed using reliable and indigenously developed attitude scales.

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