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Factors that effect dental caries status of medical students in Udaipur city, India

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Abstract: *Objective:* To evaluate the effect of oral hygiene behaviour, dental anxiety, self assessed dental status and treatment necessity on dental caries status of medical students. *Methods:* The study was conducted among 345 medical students of Udaipur city, India who had provision for free dental services and the study was based on a questionnaire which consisted of two parts, first part containing questions regarding self assessment of dental status and treatment necessity along with oral hygiene behaviour and the later part comprised of Corah Dental Anxiety scale (DAS). Clinical examination was based on the WHO caries diagnostic criteria. *Results:* Females perceived greater dental anxiety than males. Individuals claiming poor dental status had higher mean decayed, missing and filled teeth (DMFT) score (6.67) than good (2.89) and fair (4.44). The mean decayed component among the anxious students (5.4) was almost twice that of less anxious (2.77) student population. DAS constituted the first major contributor for missing component followed by smoking status which alone explained a variance of 7.1%. The cumulative variance explained by all the independent variables on the DMFT status accounted to 56.4% with self assessed dental status alone contributing a variance of 44.9%. The most significant ($P < 0.001$) contributor for filled component was self assessed dental status (14.5%). *Conclusions:* Oral hygiene behaviour, dental anxiety, self assessed dental status and treatment necessity significantly affected the dental caries status of medical students.

Key words: caries; dental anxiety; oral hygiene behaviour

Introduction

Dental diseases are detrimental to the quality of life during childhood through old age and can have an impact on self esteem, eating ability, nutrition and health. Oral diseases are associated with considerable pain, anxiety and impaired social functioning (1, 2).

Dental decay is produced by an ineffectual relationship between the bacteria in the plaque and the host defence mechanisms (3).

Tooth brushing is a simple and effective means of plaque control. People who brush their teeth frequently have less plaque than those who brush less frequency or only occasionally (4, 5).

Additionally, professional mechanical tooth cleaning is considered as a valuable approach in preventing or reducing the incidence of gingivitis, caries, progression of periodontal attachment loss and tooth loss (6, 7).

However, anxiety about dental treatment and fear of pain associated with dentistry remains wide spread (8). Studies of the prevalence of dental anxiety have produced estimates that over 10% of the population are dentally anxious (9, 10).

Dental anxiety is a major issue with respect to the provisions and access to dental care (11). It can be a prime reason for missed or cancelled dental appointments in general practice (12). In addition, it can lead to irregular dental attendance, delay in seeking treatment or its avoidance all together (13). This can have detrimental consequences for the oral health of dentally anxious people.

Dental anxiety is most commonly measured using questionnaires and rating scales, and self administrated dental fear questionnaires are of both clinical and scientific importance. The most commonly used instruments are the dental anxiety scale (DAS) (14) and the dental fear scale (15).

Self-perceived assessment of oral health status through questionnaires and interviews has been extensively studied, which represents subjective, individual perspectives based on how the person views personal oral health (16).

The single item perceived oral health rating has been found to be associated with a patient's actual clinical status, and many studies have shown that the single item perceived oral health rating is related to other self reported measures of oral health (17) and clinical measures of oral disease (18).

Furthermore, perceived or self assessed treatment needs have been found to be in relation with normative need (19).

Although there is voluminous literature regarding the dental status of children and adult population, there are very few studies from the Indian sub continent that analysed the effect of dental anxiety and other oral health behaviours on the caries status. Hence, this study intended to evaluate the effect of oral hygiene behaviour, dental anxiety, self assessed dental status and treatment necessity on caries status of medical students who had provision of free dental services.

Study population and methodology

A survey was carried out on 345 medical students of first year to fourth year who was attending a Government medical college in Udaipur city, India and had provision for free dental services. The study population had no common back ground regarding the place of birth and socio economic setting.

Target sample constituted 420 medical students from which 75 were excluded. The exclusion criteria comprised of students unwilling to participate (43) and those absent on the days of the survey (32). The mean age for all the subjects was 22.32 (2.87) ranging from the ages 18 to 25. Ethical clearance was obtained from ethical committee of Darshan Dental College and Hospital. The survey was based on questionnaire which consisted of two parts, first part consisted of questions regarding self assessed dental status, treatment necessity along with tooth brushing frequency, smoking status and time since the last dental visit, while the later part recorded Corah DAS (15) to measure dental anxiety. Scale ranges from 4 to 20. Population normative mean scores have been reported as 8–9, and a DAS score of 13 or higher indicates high dental anxiety (20, 21).

Each participant assessed his dental status as good, fair or poor, while the treatment necessity was recorded as no need, moderate need (few treatments required) or high need (numerous treatments required).

Smokers constituted those who currently smoke cigarettes daily or occasionally.

Questionnaires were distributed by one of the authors (SK) during a lecture for each year with prior permission from the Dean of the institution, and the aims of the study were clearly explained to all the participants. There was no specific time allocated for completion of the questionnaire.

All participants took part in the study voluntarily and no incentives were provided for the respondents.

Clinical examination for caries was based on the WHO caries diagnostic criteria for decayed, missing and filled teeth (22). All the clinical examinations were performed by a single clinician by using mouth mirror and standard explorer in a 'Mobile Dental Unit' so as to standardize the clinical procedures.

Intra-examiner variability for various components of DMFT was assessed and it ranged from 0.88 to 0.96.

All the data collected were entered into the spreadsheets. SPSS software version 15.0 (Chicago, Illinois) was used for statistical analysis. Mean values and standard deviations were calculated for decayed, missing and filled components of DMFT. One way ANOVA and independent samples t-test were used for continuous data, whereas chi squared test was used to analyse discrete data.

Step wise multiple linear regression analysis was performed to determine the importance of the factors that affected the caries status. A set of independent variables including smoking, last dental visit, self assessed dental status, self assessed treatment necessity, frequency of cleaning teeth and DAS were considered.

Results

Table 1 illustrates that approximately three-fourth (76.5%) of the participants brushed once a day, and 17% reported that they never visited dentist since the last 3 years. Nearly, half the population (46.4%) perceived their oral health to be fair compared to 34.5% and 19.1% perceiving it as good and poor respectively. Of all the participants, 27.5% assessed their dental treatment necessity as high in contrary to 23.4% who per-

ceived no treatment need. DAS score of 13 or higher indicates higher dental anxiety and was observed in 13% of the participants.

Subjects who brushed less frequently presented greater scores for DMFT and its components as demonstrated in Table 2. In regard to last dental visit, subjects who have not

Table 1. **Frequency distribution of study sample according to gender, self assessed dental status, treatment necessity, oral hygiene behaviour and dental anxiety**

Characteristic		Number (%)
Gender	Male	224 (64.9)
	Female	121 (35.1)
Frequency of tooth brushing	Once a day	261 (75.7)
	Twice a day	70 (20.3)
	>2 times a day	14 (4.1)
Last dental visit	<1 year	133 (38.6)
	1–3 years	151 (43.8)
	>3 years	61 (17.7)
Smoking	Yes	81 (23.5)
	No	264 (76.5)
Self assessed dental status	Good	119 (34.5)
	Fair	160 (46.4)
	Poor	66 (19.1)
Self assessed treatment necessity	High	95 (27.5)
	Moderate	166 (48.1)
	No need	84 (24.3)
Dental anxiety	DAS score <13	300 (87)
	DAS score >13	45 (13)

DAS, dental anxiety scale.

Table 2. **Bivariate analysis depicting mean DMFT and its components in relation to various independent variables among the study sample**

Independent variables	Decayed teeth (DT)	Significance	Missing teeth (MT)	Significance	Filled teeth (FT)	Significance	DMFT	Significance
Frequency of tooth brushing*								
Once a day	3.26 (1.79)	0.003	0.13 (0.38)	0.218, NS	1.37 (1.25)	0.022	4.76 (2.42)	0.001
Twice a day	2.80 (1.66)		0.07 (0.25)		1.26 (1.31)		4.13 (2.11)	
>2 times a day	1.79 (2.04)		0.00 (0.00)		0.43 (0.64)		2.21 (2.00)	
Last dental* visit								
<1 years	2.48 (1.59)	0.000	0.23 (0.20)	0.003	2.16 (0.96)	0.000	4.87 (1.85)	0.000
1–3 years	3.00 (1.62)		0.13 (0.37)		1.26 (1.19)		4.39 (2.03)	
>3 years	4.75 (1.67)		0.05 (0.49)		0.97 (1.56)		5.77 (2.44)	
Smoking**								
Smokers	4.05 (2.06)	0.000	0.27 (0.54)	0.000	1.69 (1.58)	0.004	6.01 (2.60)	0.000
Non-smokers	2.82 (1.61)		0.06 (0.24)		1.19 (1.11)		4.08 (2.18)	
Self assessed dental status*								
Good	2.07 (1.19)	0.000	0.11 (0.31)	0.000	0.82 (0.98)	0.000	2.89 (1.40)	0.000
Fair	3.07 (1.48)		0.04 (0.20)		1.32 (1.14)		4.43 (1.81)	
Poor	5.09 (1.80)		0.29 (0.57)		2.17 (1.48)		7.55 (2.31)	
Self assessed treatment necessity*								
High	4.42 (1.84)	0.000	0.22 (0.50)	0.002	2.07 (1.31)	0.000	6.72 (2.33)	0.000
Moderate	2.84 (1.54)		0.07 (0.26)		1.14 (1.18)		4.06 (1.90)	
No need	2.15 (1.36)		0.07 (0.25)		0.76 (0.88)		2.99 (1.50)	
DAS**								
Low	2.77 (1.60)	0.000	0.08 (0.26)	0.000	1.20 (1.17)	0.000	4.04 (2.09)	0.001
High	5.40 (1.35)		0.36 (0.64)		2.04 (1.50)		7.80 (1.66)	

DAS, dental anxiety scale.
*One way ANOVA; **independent samples t-test.

visited a dentist since the last 3 years had the highest untreated caries and the lowest missing and filled teeth.

Non-smokers experienced lower caries than smokers, and the missing component among smokers was nearly four times greater than non-smokers ($P = 0.000$). Individuals claiming poor dental status had significantly higher mean DMFT score (7.55) than those who perceived their oral health to be good (2.89) and fair (4.43). Furthermore, participants with high treatment necessity reported higher caries than those who perceived moderate and no treatment need ($P = 0.0001$). Dental anxiety was significantly related to DMFT and its components with anxious individuals presenting higher scores than less anxious subjects. The mean decayed component among the anxious students was almost twice that of less anxious student population.

It is evident from Table 3 that all the independent variables entered in the linear regression analysis significantly influenced

Table 3. Stepwise multiple linear regression analysis with DMFT and its components as dependent variables, and self assessed dental status, treatment necessity, oral hygiene behaviour and dental anxiety as independent variables

Model	R	R^2	Adjusted R^2	SE of estimate
Decayed (dependent variable)				
1	0.262 (a)	0.069	0.061	0.6000
2	0.369 (b)	0.136	0.121	0.5804
3	0.410 (c)	0.168	0.146	0.5721
Missing (dependent variable)				
1	0.267 (d)	0.071	0.069	0.340
2	0.341 (e)	0.116	0.111	0.332
Filled (dependent variable)				
1	0.381 (f)	0.145	0.142	1.164
2	0.432 (g)	0.186	0.182	1.137
DMFT (dependent variable)				
1	0.670 (h)	0.449	0.447	1.808
2	0.715 (i)	0.511	0.508	1.706
3	0.734 (j)	0.539	0.535	1.658
4	0.743 (k)	0.552	0.547	1.637
5	0.751 (l)	0.564	0.557	1.618

DAS, dental anxiety scale.
[a]Predictors: (Constant), self assessed dental status.
[b]Predictors: (Constant), self assessed dental status, smoking status.
[c]Predictors: (Constant), self assessed dental status, smoking status, DAS.
[d]Predictors: (Constant), DAS.
[e]Predictors: (Constant), DAS, smoking status.
[f]Predictors: (Constant), self assessed treatment necessity.
[g]Predictors: (Constant), self assessed treatment necessity, time since the last dental visit.
[h]Predictors: (Constant), self assessed dental status.
[i]Predictors: (Constant), self assessed dental status, smoking.
[j]Predictors: (Constant), self assessed dental status, smoking, DAS.
[k]Predictors: (Constant), self assessed dental status, smoking, DAS, self assessed treatment necessity.
[l]Predictors: (Constant), self assessed dental status, smoking, DAS, self assessed treatment necessity and time since the last dental visit.

the DMFT status. Self assessed dental status constituted the first best predictor for decayed and filled components in addition to the total caries experience. However, dental anxiety was the first predictor for missing component.

The cumulative variance explained by all the independent variables on the DMFT status accounted to 56.4% with self assessed dental status alone contributing a variance of 44.9%. The other variables that were significantly related to DMFT in the descending order were smoking, DAS, self assessed treatment necessity and time since the last dental visit.

Discussion

This study represents one of the first attempts from India to explore the effect of self assessed dental status and treatment necessity, oral hygiene behaviour, dental anxiety on caries status among medical students.

Three quarters of the participants brushed once a day and had poor caries status than more frequent brushers. It has been reported by Dominguez-Rojas (23) that the prevalence of regular tooth brushing has a positive impact on dental caries.

Furthermore, as most people nowadays use tooth paste containing fluoride, increased brushing frequency is likely to reduce dental caries.

Significantly higher levels of untreated caries existed for subjects who have not visited the dentist since 3 years, however the missing and filled component decreased as the time since the last dental visit increased.

Moreover, it was observed that smoking was related to higher caries experience which supports previous reports (24, 25).

Previous literature suggests that smokers have more plaque (26) and calculus (27) and thus exhibit poor oral hygiene, have higher rate of dental caries (28), periodontal diseases and tooth loss than non-smokers (29).

Nearly 20% of participants perceived their dental status as poor and presented greater DMFT scores. Additionally, participants perceiving high treatment necessity reported higher caries than those who supposed moderate or no treatment need.

Todd *et al.* (30) observed substantial agreement between lay and professionals' assessment of the oral health status. Similarly in this study, individuals claiming poor dental status experienced higher untreated caries than those who perceived their oral health to be good and fair.

However, few studies reported that the correlation between epidemiological index registrations and self-perceived oral health is weak (31, 32).

In this study, 13% subjects experienced high dental anxiety while a national cross-sectional survey of dental anxiety in the

French adult population (33) of 13.5%, which is nearly similar to our study.

This study is in agreement with the previous reports (34, 35), where non-anxious adolescents presented lower caries severity than adolescents who were dentally anxious.

Self assessed dental status and DAS significantly influenced the decayed component of DMFT. Individuals who perceive their dental status as good tend to follow the modest oral hygiene procedures which in turn influences tooth decay, and subjects with high dental anxiety tend to avoid dental visits and as a result have cumulated untreated dental disease.

However, DAS constituted the first major contributor for missing component followed by smoking status, which can be attributed to the avoidance of regular dental care among anxious individuals that lead to the need for dental extractions. Chen et al. (29) in a 10 year longitudinal study observed that smokers exhibit greater tooth loss than non-smokers.

Filled component of DMFT was related to time since the last dental visit, and subjects who visit dentist more frequently are inclined to undergo more treatment procedures.

In conclusion, it was observed from this study that oral hygiene behaviour, dental anxiety, self assessed dental status and treatment necessity significantly affected the dental caries status of medical students. Subjects brushing and visiting the dentist less frequently presented poor caries status. Similarly, medical students who perceived poor oral health status, high treatment need and high dental anxiety exhibited greater DMFT scores.

Acknowledgements

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