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INFLUENCE OF SLEEP DISTURBANCE, FATIGUE, VITALITY ON ORAL HEALTH AND ACADEMIC PERFORMANCE IN INDIAN DENTAL STUDENTS

KAILASH ASAWA, NANDINI SEN, NAGESH BHAT, MRIDULA TAK, PRATIBHA SULTANE, ARITRA MANDAL

Public Health Dentistry, Pacific Dental College & Hospital, Udaipur, India

Abstract

Background. *Oral health and academic performance are important contributing factors for a student's professional life. Countless factors affect both, among which sleep, vitality and fatigue are less explored areas that also have a strong impact.*

Objective. *The objective of the study was to assess the association of sleep disturbances, fatigue and vitality with self reported oral health status, oral hygiene habits and academic performance of dental students of Udaipur.*

Methods. *A descriptive cross-sectional study was conducted among undergraduate and postgraduate dental students of Udaipur. Self-administered structured questionnaire was used to assess the psychological factors, vitality, sleep quality, fatigue, self reported oral health status, habits and academic performance. Analysis of variance and stepwise multiple linear regression were utilized for statistical analysis with 95% confidence level and 5% level of significance.*

Results. *Of the 230 participants, 180 (78.3%) were undergraduates and 50 (21.7%) were postgraduates. Among them, females showed higher scores in disturbed sleep index (2.69±2.14) as compared to males (2.45±1.91). Respondents who had "Poor" dental health, scored more in disturbed sleep index (3.15±1.64) and fatigue scale (20.00±4.88). Subjects who flossed "everyday", were found to have good sleep and more energy (p=0.01) and those who assessed themselves as excellent students scored more in the Vitality Scale (p=0.01) and less in the Sleep index (p=0.01).*

Conclusion. *The present study confirms that disturbed sleep, aliveness and fatigue, all are interlinked with each other and are imperative factors having the potential to alter the oral health status, habits and academics of dental students.*

Keywords: sleep, fatigue, oral health, dental, students

Introduction

An integral part of good health and quality of life is oral health. Life expectancy and good quality of life are dependent on systemic health of an individual, which can be adversely affected by poor oral health. Diminished quality of life and financial and social costing comes with oral health ignorance [1]. Students are the main role players in the dental education process [2]. Proper knowledge of dental students is vital to diagnose and perform various dental treatments, and this knowledge level can be judged by the academic performance of the students.

Oral health and academic performance are affected by so many factors like poor oral hygiene behavior, unhealthy diet, tobacco and alcohol usage, social determinants, family environment, sleep quality, fatigue, stress, vitality, parents' knowledge and attitude, poverty [3-7]. Sleep, vitality and fatigue are comparatively less explored arenas in relation to oral health and academic performance, inspite of having significant impact.

Sleep is undoubtedly an important aspect of a successful academic and economically prosperous career.

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Address for correspondence: kailashasawaudr@yahoo.com

Students who well understand the importance of a proper sleeping habit can improve their academic performance where usually it is noted that adults require 8 hours sleep a day [8,9]. In the modern society, sleep disturbances have become quite frequent along with which several risk factors have also been identified like female gender, depression, snoring, nocturnal micturition, use of hypnotic drugs, stressful lifestyle [10]. Sleep quality and pattern should be considered as an important issue for college students, as both maintenance of oral hygiene and academic performance is affected by it and affects cognitive functioning.

A much discussed topic in medicine and psychology is fatigue, which is considered to be the main component of chronic fatigue syndrome and burnout syndrome. Not only insomnia, but irregular lifestyle, physical illness, socio-demographic factors all are the causal risk factors for fatigue [10]. Subjective vitality can be described as the self feeling of being alive, full of energy and liveliness. It is a dynamic state in which an individual feels the change in energy flow and self energy level as a result of physical and psychological factors [10]. The result of a study conducted at the National Taiwan University, Taipei, on junior high school students by Gau Soong in 1995 [11] evidenced that sleep duration of students was directly proportional with the study pressure. Fatigue, drowsiness, impatience throughout the day are direct consequences of shorter sleep duration at night, which obviously leads to difficult awakening in the morning.

In a study by Nabavi and Bohiraie in 2003 [12] on academic students of Persia, high prevalence of night terror and fearful dreams (44%), insomnia (23.5%), daily sleepiness (64.5%), morning headaches (20%) were found, which negatively affected their oral hygiene and academic performance.

According to a study conducted by Oginska and Pokorski in 2006 [13] on school children, students and employees, 50% of them were found to show daytime sleepiness as a major problem. It was found that 60% students stated that they were tired, sleepy and dragging themselves to the college [14].

It is necessary for a developing country like India, that the college students are in healthy state, as they represent the future investment of a country [8]. In a research by Eslami Akbar R in 2012 [15] on medical students residing at the dormitories of Jahrom University of Medical Sciences, the results suggest that 43.9% of the study subjects were affected by the consequences of sleep disorders including loss of vitality & being tired during daytime (48.8%), excess sleepiness during the classes (45.5%), deferment in attending the classes (23%) and absence in routine curriculum (20.6%). Educational performance is negatively impacted mainly by stress and secondly by sleep problems as ranked by students.

A detrimental effect on oral hygiene and treatment compliance was found to be linked with negative self-assessment and depression of an individual [8]. Depression leads to fatigue, loss of liveliness and troubled sleep. Interest for the basic self-caring tasks performed in daily life is lost when someone is depressed, because of which oral hygiene practices are affected, which can lead to dental caries and periodontal problems.

Due to the scarcity of reports in literature, more research has to be done to study the combined effect of sleep disturbances, vitality and fatigue, which are all interlinked with the oral health and academic performance of college students. So, this study was conducted with an objective to assess the association of sleep disturbances, fatigue and vitality with self- reported oral health status, oral hygiene habits and academic performance of the dental students.

Materials and method

Study design and population

A descriptive cross sectional study was conducted among undergraduate and postgraduate dental students of Udaipur city, Rajasthan, India in the month of March 2016. Study population consisted of First, Second, Third, Fourth year dental undergraduate, interns and postgraduate students.

Ethical approval and official permission

The study protocol was reviewed and approved by the Institutional Review Board of Pacific Dental College & Hospital and was granted ethical clearance.

Informed consent

Written informed consent was obtained from participants after explaining the nature and purpose of research.

Pre-testing of questionnaire

Questionnaire was administered to 15 students, twice on successive days, who were interviewed to gain feedback on the overall acceptability of the questionnaire in terms of length, language clarity, time and feasibility of students completing and returning it. Based on their feedback, the questionnaire did not require any corrections. Cronbach's coefficient was found to be 0.80, which showed an internal reliability of the questionnaire. Mean Content Validity Ratio (CVR) was calculated as 0.87 based on the opinions expressed by the panel of six academicians. Face validity was also assessed and it was observed that 92% of the participants found the questionnaire to be easy.

Questionnaire details

A structured self-administered questionnaire written in English was used, which consisted of 8 sections. Section I solicited general demographic information. Section II comprised of 3 questions to assess the psychological factors. Section III comprised of Subjective Vitality Scale (SVS) by Ryan & Frederick in 1997 [16] - a seven-item survey scale.

Section IV consisted of Pittsburgh Sleep Quality Index (PSQI) by Byusse et al in 1988 [17] - which had 9 questions assessing an individual's usual sleep habits. Section V represents a 10 item Fatigue Assessment Scale (FAS). Section VI integrates 7 close-ended questions to assess the self-reported oral health status. Section VII comprised of 5 close-ended questions to assess self-reported oral health habits. Section VIII consists of 5 close – ended questions to assess the self-reported academic performance. Academic performance was assessed by the percentage of marks attained by the students in previous year examinations and categorized into Excellent (≥80%), Good (60-80%), Fair (50-60%) and Poor (<50%).

Pilot study

A pilot survey was conducted among 30 dental students. Based on the results of the pilot study using 95% confidence interval, 5% allowable error and 80% power of the study, sample size was calculated, applying the following formula:

$$(n) = (s_1^2 + s_2^2)\ \frac{[Z_{1-\alpha/2} + Z_{1-\beta}]^2}{(\bar{x}_1 - \bar{x}_2)^2}$$

where, Mean of Group 1 = $\bar{x}_1$,Mean of Group 2 = $\bar{x}_2$, Standard deviation in Group 1 = S1, Standard deviation in Group 2 = S2, Value of the Normal Deviate at considered level of Confidence = Z1-α/2 (Two sided test) and Value of the Normal deviate at considered power of the study = Z1-β.

The value obtained was corrected using the "finite population correction factor" and the final sample size was calculated to be 230.

Methodology

A list of 5 dental colleges in Udaipur city was obtained by the investigator. One was randomly selected from it, i.e. Pacific Dental College & Hospital. Using probability proportional sampling technique, 36 from each undergraduate year and overall 50 postgraduates were to be selected. The study participants were then selected by simple random sampling method.

A structured, self-administered questionnaire in English was distributed to the selected dental students of the college. Participants were asked to rate each item of the scales and choose the most appropriate response.

The questionnaire was given to Undergraduate students in a classroom and Postgraduate students in their respective departments and instructed to fill it. Ample time was given to fill the questionnaire. All questionnaires were collected from the students by 2-3 successive follow-ups and checked carefully for their completeness.

Statistical analysis

Completed questionnaires were coded, compiled and entered in a spreadsheet computer program (Microsoft Excel 2013) and then exported to data editor page of SPSS version 20.0 (SPSS Inc., Chicago, Illinois, USA) and analyzed. Descriptive statistics, one way ANOVA and stepwise multiple linear regression analysis were used for statistical analysis with confidence interval and p-value set at 95 % and ≤0.05 respectively.

Results

A total of 230 (100%) study subjects participated in the study. Demographic data showed that majority of the respondents were females (n=172 [74.8%]). Most of the participants were undergraduates (n=180 [78.3%]) and had no adverse habits (n=200 [87.0%]) (Table I).

Table I. Distribution of study population according to several demographic variables.

Variables	Number (n)	Percentage (%)
Age (years)		
18 – 25	180	78.3
26 and above	50	21.7
Gender		
Male	58	25.2
Female	172	74.8
Level of Education		
Undergraduate	180	78.3
Postgraduate	50	21.7
Total	230	100

Table II shows the association of demographic variables with vitality, sleep and fatigue scores (Mean±SD) among study subjects. It was found that students above 25 years of age, scored more in the PSQI (p=0.024) and in the FAS (p=0.001). Females showed a comparatively higher SVS, PSQI and FAS scores than males. Subjects who were on mixed diet (Non-vegetarian) showed higher scores in the FAS (p=0.017) than those on vegetarian diet. Postgraduate students had higher tendency of disturbed sleep (p=0.024) and also higher fatigue levels (p=0.001).

Table III depicts the association of self-reported oral health status with sleep, vitality and fatigue scores (Mean ±SD) among study subjects. A significant association of perceived dental health of the participants was found with SVS, PSQI & FAS scores (p=0.01). Participants who rated their gingival condition as 'excellent', presented lower score in PSQI (p=0.001) and those who rated signs of bleeding as 'Yes', scored significantly more in the FAS (p=0.021), which were statistically significant.

Table II. Association of demographic variables with Vitality, Sleep and Fatigue Scores (Mean ± SD) among study subjects.

Demographic Variables	Subjective Vitality Scale Score (Mean±SD)	Pittsburgh Sleep Quality Index Score (Mean±SD)	Fatigue Assessment Scale Score (Mean±SD)
Age (years)			
18 – 25	4.08±1.13	2.47±1.92	19.83±4.25
26 and above	3.78±0.99	3.22±2.54	22.00±3.94
P value	0.091	0.024*	0.001*
Gender			
Male	3.89±1.04	2.45±1.91	20.97±4.41
Female	4.06±1.12	2.69±2.14	20.08±4.22
P value	0.961	0.589	1.859
Diet			
Vegetarian	4.04±1.13	2.60±2.09	20.03±4.21
Mixed	3.86±0.92	2.82±2.09	21.91±4.33
P value	0.367	0.561	0.017*
Level of Education			
Undergraduate	4.08±1.13	2.47±1.92	19.83±4.25
Postgraduate	3.78±0.99	3.22±2.54	22.00±3.94
P value	0.091	0.024*	0.001*
Adverse habits			
None	4.02±1.10	2.66±2.11	20.32±4.14
Smoking Tobacco	4.17±1.20	2.43±2.02	21.07±5.32
Smokeless Tobacco	2.14±0.00	3.00±0.00	18.00±0.00
Alcohol	3.65±0.97	2.14±2.41	19.00±4.47
Smoking & Alcohol	4.16±1.06	2.75±1.75	20.00±6.11
P value	0.403	0.964	0.841
Total	4.01±1.10	2.63±2.08	20.30±4.27

Statistical test applied: One way ANOVA.
* Indicates statistically significant difference at $p \leq 0.05$.

Table III. Association of Vitality, Sleep and Fatigue Scores (Mean±SD) with Self-reported Oral Health Status among study subjects.

Self-reported Oral Health Status	Subjective Vitality Scale Score (Mean±SD)	Pittsburgh Sleep Quality Index Score (Mean±SD)	Fatigue Assessment Scale Score (Mean±SD)
Perceived dental health			
Poor	3.36±0.60	3.15±1.64	20.00±4.88
Normal	3.58±0.92	3.06±2.02	22.00±3.46
Good	4.07±0.82	1.72±2.33	17.52±3.71
Very Good	4.27±0.59	0.93±0.26	15.29±0.99
Excellent	5.45±0.33	2.33±1.50	21.00±4.85
P value	0.01*	0.01*	0.01*
Current non-treated caries			
Yes	4.25±1.04	2.16±1.49	19.78±4.41
No	3.90±1.12	2.87±2.29	20.57±4.19
P value	0.066	0.087	0.187
Current extracted teeth			
Yes	3.66±1.15	2.55±1.46	19.47±4.40
No	4.21±1.03	2.67±2.37	20.78±4.14
P value	0.01*	0.679	0.079
Satisfaction by appearance of own teeth			
Yes	4.12±1.24	2.87±2.45	19.14±3.75
No	3.83±0.80	2.23±1.17	22.26±4.41
P value	0.115	0.066	0.01*
Toothache last time			
Do not remember	4.83±0.94	2.20±2.06	19.13±4.76
More than a year ago	3.13±1.15	2.83±2.28	21.33±3.71
During last year	3.15±0.55	2.93±1.46	20.14±5.44
During last 3 months	4.71±0.59	3.82±1.66	21.00±1.78
Last week	4.71±0.69	1.81±1.42	22.38±2.52
P value	0.01*	0.032*	0.004*
Self-reported gingival condition			
Poor	3.95±0.99	2.74±1.73	21.48±3.85
Normal	3.82±1.08	2.15±2.17	20.25±4.50
Very Good	5.23±0.53	1.08±1.35	19.62±2.88
Excellent	4.78±01.31	1.00±4.24	19.50±4.95
P value	0.01*	0.001*	0.079
Self-reported gum bleeding			
No signs	4.02±1.13	2.64±2.20	19.98±4.33
Yes	4.00± 0.97	2.60±1.55	21.62±3.21
P value	0.944	0.914	0.021*
Total	4.01±1.10	2.63±2.08	20.30±4.27

Statistical test applied: One way ANOVA.
*Indicates statistically significant difference at $p \leq 0.05$.

Table IV shows the association of self-reported oral health habits with sleep, vitality and fatigue scores (Mean±SD) among study subjects. Subjects who flossed "everyday", presented higher score in the SVS, lower score in PSQI (p=0.01) which were statistically significant. Significant associations were found between mouth rinsing frequency of students with SVS, PSQI and FAS scores (p=0.01).

Table V shows the association of self-reported academic performance and psychological variables with sleep, vitality and fatigue scores (Mean±SD) among study subjects. Participants who assessed themselves as excellent students scored more in the Vitality scale (p=0.01) and less in PSQI and FAS (p=0.01). Those who were attentive in lectures, had higher levels of vitality (p=0.002) and scored lower in the PSQI (p=0.01). Students who felt energetic during their clinical work showed significant association with lower PSQI& lower FAS scores (p=0.01).

Table IV. Association of Vitality, Sleep and Fatigue Scores (Mean±SD) with Self-reported Oral Health Habits among study subjects.

Self-reported Oral Health Habits	Subjective Vitality Scale Score (Mean±SD)	Pittsburgh Sleep Quality Index Score (Mean±SD)	Fatigue Assessment Scale Score (Mean±SD)
Daily tooth brushing frequency			
Once a day or less	4.67±0.90	2.29±1.68	21.58±3.97
Twice a day	3.88±1.12	2.66±2.13	19.93±4.47
More than twice a day	4.63±1.08	3.00±2.35	20.32±3.39
P value	0.179	0.33	0.075
Flossing frequency			
Never	3.25±1.05	2.67±1.18	18.44±3.00
Once a month	4.10±1.01	2.74±2.32	20.79±4.41
Once a week	4.26±0.84	3.22±2.57	21.14±4.34
More than once a week	4.14±0.47	0.91±0.30	21.27±2.41
Everyday	5.17±0.69	0.91±0.30	21.27±2.41
P value	0.01*	0.01*	0.360
Mouth rinse frequency			
Never	3.33±1.08	2.73±1.40	22.80±4.08
Once a month	3.84±0.95	2.98±2.42	21.53±4.38
Once a week	4.56±0.99	2.90±2.38	20.98±4.08
More than once a week	4.71±0.82	1.75±0.95	23.25±2.87
Everyday	4.94±0.64	1.29±1.11	16.71±2.05
P value	0.01*	0.01*	0.01*
Last dental visit			
< 6 months ago	5.03±0.73	1.88±1.51	18.71±2.86
6 – 12 months ago	4.13±0.91	1.44±0.92	19.55±4.72
1-2 years ago	3.29±0.94	4.48±1.99	22.12±3.72
> 2 years ago	5.10±0.81	0.75±1.03	18.00±4.07
P value	0.065	0.177	0.069
Reason for dental visit			
Pain	3.86±1.30	2.10±1.55	19.38±3.75
Needed treatment	3.77±0.98	1.55±0.71	16.82±2.43
Checkup	4.04±0.60	2.79±1.83	11.24±3.90
Tooth cleaning/Scaling	4.34±1.31	3.65±2.90	19.91±4.36
Others	3.92±1.13	2.70±1.83	20.50±3.06
P value	0.110	0.115	0.069

Statistical test applied: One way ANOVA. *Indicates statistically significant difference at p≤0.05.

Significant associations were found between anxious feeling in everyday life with SVS, PSQI & FAS scores (p=0.001). Students who rated 'Yes, frequently' for being stressed, scored less in SVS and more in the disturbed sleep index & Fatigue scale (p=0.001).

The best predictors in the descending order for Vitality were perceived dental health, feeling stressed in everyday life, anxious feeling in everyday life, flossing frequency, self-reported gingival condition, toothache last time and depressed feeling in everyday life.

Table V. Association of Vitality, Sleep and Fatigue Scores (Mean±SD) with Self-reported Academic Performance and Psychological variables among study subjects.

Self-reported Academic Performance	Subjective Vitality Scale Score (Mean±SD)	Pittsburgh Sleep Quality Index Score (Mean±SD)	Fatigue Assessment Scale Score (Mean±SD)
Self-assessment as a student			
Excellent	5.12±0.67	1.00±0.00	17.00±2.21
Good	3.95±1.37	2.90±1.98	20.31±4.24
Fair	4.12±0.88	1.81±1.24	19.80±4.38
Poor	3.03±0.30	5.63±1.74	24.11±1.91
P value	0.01*	0.01*	0.01*
Academic performance			
Excellent	5.45±0.75	1.60±0.49	21.33±4.74
Good	4.14±1.41	2.66±1.98	20.03±3.85
Fair	3.85±1.00	3.09±2.39	20.13±4.25
Poor	4.35±0.30	0.50±0.70	14.50±2.12
P value	0.002*	0.077	0.074
Attentiveness in lectures			
Yes	4.16±1.12	1.91±1.57	19.47±4.34
No	3.67±0.98	4.30±2.19	22.25±3.43
P value	0.002*	0.01*	0.01*
Energetic feeling while doing clinical work			
Yes	4.29±1.31	1.92±1.76	19.14±3.75
No	3.72±0.73	3.38±2.14	23.22±3.11
P value	0.055	0.01*	0.01*
Anxious feeling in everyday life			
No, never	5.09±0.90	1.13±0.67	16.23±4.18
Yes, sometimes	3.99±1.07	2.06±1.39	20.19±4.87
Yes, frequently	3.30±0.64	5.95±1.65	23.83±2.68
P value	0.001*	0.001*	0.001*
Stressed feeling in everyday life			
No, never	4.95±0.64	1.29±0.90	17.92±3.93
Yes, sometimes	4.01±1.19	2.50±1.93	19.34±4.17
Yes, frequently	3.27±0.49	3.95±2.28	24.00±1.57
P value	0.001*	0.001*	0.001*
Depressed feeling in everyday life			
No, never	4.64±0.76	2.41±2.04	19.10±4.40
Yes, sometimes	3.85±1.05	2.71±2.30	21.00±3.95
Yes, frequently	2.80±1.10	2.96±0.72	20.92±0.90
P value	0.001*	0.417	0.005*

Statistical test applied: One way ANOVA. *Indicates statistically significant difference at $p \leq 0.05$.

The best predictors in the descending order for Sleep were anxious feeling in everyday life, attentiveness in lectures, flossing frequency and self-reported gingival condition. The best predictors in the descending order for Fatigue were energetic feeling while doing clinical work, anxious feeling in everyday life, satisfaction by appearance of own teeth, depressed feeling in everyday life, self-assessment as a student and age (Table VI).

Table VI. Stepwise Multiple Linear Regression analysis with Vitality, Sleep and Fatigue as dependent variables.

Model	R	R2	F	P
Vitality				
1	0.581 (a)	0.338	116.323	0.000 (b)
2	0.700 (b)	0.490	108.951	0.000 (c)
3	0.765 (c)	0.585	105.989	0.000 (d)
4	0.807 (d)	0.652	105.323	0.000 (e)
5	0.849 (e)	0.721	115.579	0.000 (f)
6	0.861 (f)	0.741	106.452	0.000 (g)
7	0.864 (g)	0.746	93.021	0.000 (h)
a. Predictors: (Constant), Perceived dental health				
b. Predictors: (Constant), Perceived dental health, Stressed feeling in everyday life				
c. Predictors: (Constant), Perceived dental health, Stressed feeling in everyday life, Anxious feeling in everyday life				
d. Predictors: (Constant), Perceived dental health, Stressed feeling in everyday life, Anxious feeling in everyday life, Flossing frequency				
e. Predictors: (Constant), Perceived dental health, Stressed feeling in everyday life, Anxious feeling in everyday life, Flossing frequency, Self-reported gingival condition				
f. Predictors: (Constant), Perceived dental health, Stressed feeling in everyday life, Anxious feeling in everyday life, Flossing frequency, Self-reported gingival condition, Toothache last time				
g. Predictors: (Constant), Perceived dental health, Stressed feeling in everyday life, Anxious feeling in everyday life, Flossing frequency, Self-reported gingival condition, Toothache last time, Depressed feeling in everyday life				
Sleep				
1	0.683 (a)	0.467	199.437	0.000 (b)
2	0.760 (b)	0.573	154.908	0.000 (c)
3	0.776 (c)	0.597	114.014	0.000 (d)
4	0.619 (d)	0.612	91.282	0.000 (e)
a. Predictors: (Constant), Anxious feeling in everyday life				
b. Predictors: (Constant), Anxious feeling in everyday life, Attentiveness in lectures				
c. Predictors: (Constant), Anxious feeling in everyday life, Attentiveness in lectures, Flossing frequency				
d. Predictors: (Constant), Anxious feeling in everyday life, Attentiveness in lectures, Flossing frequency, Self-reported gingival condition				
Fatigue				
1	0.666 (a)	0.444	181.783	0.000 (b)
2	0.735 (b)	0.540	133.109	0.000 (c)
3	0.761 (c)	0.580	103.902	0.000 (d)
4	0.770 (d)	0.593	81.971	0.000 (e)
5	0.782 (e)	0.612	70.706	0.000 (f)
6	0.790 (f)	0.624	61.561	0.000 (g)
a. Predictors: (Constant), Energetic feeling while doing clinical work				
b. Predictors: (Constant), Energetic feeling while doing clinical work, Anxious feeling in everyday life				
c. Predictors: (Constant), Energetic feeling while doing clinical work, Anxious feeling in everyday life, Satisfaction by appearance of own teeth				
d. Predictors: (Constant), Energetic feeling while doing clinical work, Anxious feeling in everyday life, Satisfaction by appearance of own teeth, Depressed feeling in everyday life				
e. Predictors: (Constant), Energetic feeling while doing clinical work, Anxious feeling in everyday life, Satisfaction by appearance of own teeth, Depressed feeling in everyday life, Self-assessment as a student				
f. Predictors: (Constant), Energetic feeling while doing clinical work, Anxious feeling in everyday life, Satisfaction by appearance of own teeth, Depressed feeling in everyday life, Self-assessment as a student, Age				

Discussion

Sleep plays a vital role in healthy development through childhood and adolescence. To the best of our knowledge, the present research is one of its kind to assess the association of Sleep disturbance, Fatigue, Vitality with Oral health and Academic performance of Dental students. It is observed in this study that students above 25 years of age have more fatigue and disturbed sleep. This can be explained by the fact that with increasing age, higher level of education is achieved. This consequently intensifies the academic and clinical work load, contributing in raising the stress levels. For the same reasons, postgraduates are also having a greater tendency of disturbed sleep and getting easily fatigued, as seen in the present study.

The study results have also revealed that females have greater sleep disturbance compared to males which is in accordance with the study by Middlekoop et al. in 1996 [18] where it has been reported that the prevalence of sleep disorder was higher in women than in men, with the possible reasoning that women are more thoughtful in nature, get easily stressed, more involved in family issues and hormonal disturbances. On the other hand, Waqas et al. in 2015 [19] presented in his study that there was no significant association between gender & sleep disturbances among medical students of Pakistani medical schools.

One interesting finding in the present research was Non-vegetarian eaters were having higher scores in the FAS. This finding might be attributed to the fact that Non-vegetarian diet usually contains more fat which takes more time in digestion, and can lead to obesity. Obesity has been shown to be associated with excessive daytime sleepiness and fatigue in a study by Vgontzas AN et al. (2006) [20].

Gilbert et al. in 2010 [21] found that the average number of sleep hours in a sample of 557 undergraduate Introductory Psychology students was 7.2±1.2, which is congruent with our research findings that the mean number of sleep hours at night for all students was 7.17±1.34 and the average PSQI score was 2.63±2.08. On the other hand, it is contrary to the study done by Elagra et al. in 2016 [22] on dental students of Riyadh Colleges of Dentistry and Pharmacy, where the authors found the mean sleep duration to be less (5.85±1.853) and PSQI average score to be high (7.6±3.396). Though the mean sleep hours obtained from the current study is somewhat higher in comparison to other surveys, it is still less than the mean of 8 hours one would expect in a normal distribution of sleep duration. This might be due to absence of examinations during the study duration, students may have engaged themselves in regular sports activities as refreshment from their hectic schedule.

In the present study, it was observed that subjects who were more vibrant, less fatigued & having good sleep reported good self-perceived dental health. This is in accordance with the study by Dumitrescu et al. in 2010 [10] where significant differences were brought to notice between disturbed sleep, vitality and fatigue scales in terms of perceived dental health.

Subjects who are having disturbed sleep might be having more stress, depression, anxiety & fatigue and consequently, their enthusiasm towards oral health maintenance, performing daily oral hygiene behaviors will be less, which will give the end result "Poor" self-reported gingival condition, as found in this study. These subjects will be more prone to develop periodontal diseases as indicated in several different studies [23-26].

It is evident from prior studies performed on students elsewhere, that persons having depressive symptoms, who have less sleep and less day-to-day energy, neglect their oral hygiene as shown by Yuen et al. in 2014 [24]. In the present study, flossing and mouth rinsing were significantly more frequent in subjects with higher vitality and less PSQI and fatigue scale scores. Our findings are also consistent with findings from research about oral health behaviors, where anxiety [26-29], depression and stress have been found to be related with oral hygiene practices [23,30-33].

Students with sleep disorders fail to achieve optimum academic achievement. Decreased productivity, increased risk of treatment procedural accidents & poor quality of life are associated with excessive daytime sleepiness [34,35]. Several studies conducted by Hershner et al. in 2014 [36], Lund et al. in 2010 [37], Rosen et al. in 2006 [38] have reported that disturbed sleep is responsible for poor academic performance. In another study, Sajadi et al in 2016 [39] has correlated more fatigue with poor academic performance. These facts are also in accordance with the findings of the present study where disturbed sleep, more fatigue and less energy levels were responsible for "Poor" self-reported academic performance of students. In addition, Pallos et al. in 2004 [40] carried out a study to evaluate the incidence of sleep disorders and the following consequences, among the students of Kyoto University, Japan. They reported such consequences of sleep disorders as fatigue, disturbed health, drowsiness and class absence. Further, Pagal et al. in 2010 [41] reported 69.7% of students had a low level of energy and suffered from sleep disorders and 27.7% of students with sleep disorder suffered from concentration and attention problems.

Less aliveness, disturbed sleep and tiredness were present in pupils with higher levels of anxiety. Subjects who were stressed frequently in everyday life tend to be less vital, with more sleep disorders, as our study findings confirm. Dumitrescu et al. in 2010 [10] described in his study about reduced sleep hours, vitality, disturbed sleep in students. Similarly, a research conducted by Morin et al. in 2006 [42] revealed that insomnia was associated with distress and more fatigue. Students burdened with excessive study work & stress, which lead to fatigue or distress. will have an end result of high prevalence of fatigue.

Anxiety in everyday life was the best predictor for sleep disorders in the current research, and this fact is also supported by Waqas et al. in 2015 [19] in their study, where the authors confirmed that psychosocial stress factors were the best predictors for PSQI scores.

However, the present research has few limitations. First and foremost, the conditions like oral health status, academic performance were solely based on the self perception of the subjects. We have not done any clinical or objective examination to confirm it. Secondly, there can be other influential factors also affecting these conditions which are not being considered in this study. So, the results withdrawn are solely on subjective perceptions. However further researches can be conducted to validate the above findings by incorporating clinical examination.

We recommend the young generation to follow a proper bedtime, so that at least 8 hours of sleep is accomplished. Lifestyle, adverse habits, food routines need to be modified for healthier life. To combat academic workload and stress, one should have recreational activities in between, such as practicing meditation, active participation in sports and cultural events, indulging in their hobbies, spending fun time with friends and family.

Conclusion

The present study has shown significant association between vitality, sleep and fatigue with self-reported oral health status and academic performance among Indian dental students. Oral health habits like daily mouth rinsing and flossing were significantly associated with sleep, vitality and fatigue. Students who were good in academics were more vital, had good sleep and less fatigue. Disturbed sleep and more fatigue were reported to be the reasons for being stressed. The study confirms that disturbed sleep, more fatigue and less vitality is pressing a negative impact on the oral health and academic performance of dental students. Therefore, we recommend educational programmes to be conducted in dental schools to spread awareness among dental students about the diverse factors which can affect oral health & academic performance particularly vitality, fatigue, sleep and psychological factors.

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