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The Effect of Stress on Clinical and Preclinical Dental Students' Performance at King Abdulaziz University

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Abstract

Objectives: It is well known that dental training constitutes a stressful environment among undergraduate students. The aim of this study is to identify the effect of stressors on students' clinical and preclinical performance.

Materials and methods: A cross-sectional study was designed using a modified Dental Environment Stress questionnaire that was distributed to 288 undergraduate students within the Faculty of Dentistry of King Abdulaziz University from September 1, 2016 to April 30, 2017.

Results: One hundred and twenty-four (49.6%) respondents were females and 126 were males (50.4%). Sixth year students showed the highest responses (27.20%), while third year students showed the lowest responses (14.40%). The most stressful factors were from the theoretical domain, while the least stressful factors were from the faculty domain as well as the personal domain. ANOVA statistical tests were used to assess the mean difference in the levels of stress between the academic years of the students, which proved significant for almost all questions. The students' grades were used to measure dental performance, which recorded improvement between first and second semesters.

Conclusion: The present results indicate that recorded grades demonstrated an ascending improvement in confidence; even though the results also demonstrated that stress proportionally increases over the academic years. Our dynamic ever-evolving curriculum can explain this condition and represents the cornerstone of controlling stress among our students.

Keywords: Stress; Dental students; Preclinical performance; Clinical performance; Academic performance

Introduction

Stress is described by Webster's New World Dictionary as "a situation typically described by symptoms of mental and bodily tightness or pressure, as inflation or hypertension that can happen from a response to a state in which a person feels scared, constrained, etc." [1]. A student can be stressed due to various stressors, such as educational demands, economic demands, well-being issues or the loss of a close relative or friend [2]. It is readily recognized that students find dental education to be stressful. Among the quantity of resources gathered relating to clinical criteria, dental students exhibit greater levels of stress-related psychosomatic activity and increased mood disturbances [3]. There is a tremendous amount of published studies in the worldwide literature regarding the effect of stress on dental students' performance and the results vary according to country, culture, concerns, beliefs, and environment. A study conducted by Anee Sanders and Kurt Lushington (2002) advocated that there is a weak relation among stress and student performance in Australia [3]; however, a study performed at the University of the Western Cape by VJ Wilson, et al. stated that the stressors encountered may impact students' academic and future professional development [3,4]. A further study in Malaysia carried out in 2005 advocated that the didactic portion and apprehension of failure caused the most stress for preclinical students, while the main stressor of clinical students was found to be the practical part, especially factors relating to finishing the minimum procedural experience. Male dental students usually perceived less stress than female dental students [5]. The preclinical students appeared to exhibit less stress than their clinical colleagues; even their mentors seemed to exert less pressure when dealing with simulators. However, collective theoretical pressure, workloads, as well as current clinical events represent more stress than personal issues [6-9]. Throughout the reviewed literature, few studies regarding students' stress referred to traditions or social habits. In Saudi Arabia, traditions and family obligations are of high value and consideration. Conforming to those traditions might constitute an additional

burden on the students. These might be considered additional factors to be added to the previously discussed stress areas. Furthermore, time management, state of mind and self-confidence can also be added since it has been stated that different factors and environments may cause harmful influences on dental performance. Accordingly, this study was undertaken to evaluate stressful factors that would affect the dental students' performance whether personal, school related, and/or staff related. The aim of this study is to evaluate the effect of stress on clinical and preclinical dental students' performance within the Faculty of Dentistry of King Abdulaziz University.

Materials and Methods

This study is a cross-sectional study that was conducted from September 1, 2016 to April 30, 2017. Participants were clinical and preclinical undergraduate dental students within the Bachelor of Dental Surgery (B.D.S.) program of the Faculty of Dentistry at King Abdulaziz University who voluntarily agreed to participate. After an explanation of the study's aims and questionnaire, informed consent was given and signed by each student. A total of 250 male and female students answered our questionnaire based upon a structured questionnaire, a modified Dental Environment Stress (DES) questionnaire, relating to four principal domains that included 37-items distributed under four main headings [3]: Theoretical Stressors (TS), Personal Stressors (PS), Faculty Stressors (FS), Clinical Stressors and Pre-clinical Stressors (CPS). The stressors were ranked on a 5-point scale in which 1 demonstrated "not applicable," 2 "not stressful," 3 "mildly stressful," 4 "moderately stressful" and 5 "highly stressful." We randomly employed the sample of the subjects' grades to measure their performance as well as to compare their first and second semesters. Before distributing the questionnaire, a pilot study was conducted with junior students. Data was gathered and statistically analyzed through IBM SPSS software version 21. Ethics approval was obtained from the university's Research and Ethics Committee.

Results

Our sample size comprised 288 dental students, 250 of whom answered the entire questionnaire. Thirty-eight incomplete questionnaires were eliminated. As a result, our results are based on 250 respondents (86.80%). One hundred and twenty-four (49.6%) were female and one hundred and twenty-six were male (50.4%). The highest responses came from sixth year students (27.20%), while the lowest responses came from third year students (14.40%). Participants ranged in age from 21 and 25 years. The percentage distribution of the responses to 37 questions divided into four main domains: personal stressors, theoretical stressors, faculty stressors, and preclinical and clinical stressors. Result analysis indicated that in the faculty domain, female's exhibited more stress, while males were more stressed in the clinical and preclinical domain. Equal reactions to stress were depicted from both genders in the personal and theoretical domains. Interestingly, the stress showed a positive proportional relationship to ascending years since sixth year students showed the highest level of stress, while second year students showed the lowest level of stress. The theoretical domain was found to be consistently high among all students; scoring the highest was feeling overloaded due to a heavy syllabus, followed by stress on meeting assignment deadlines, having a lecture, clinical or laboratory session immediately before an exam on its scheduled day, and finishing by the number of study problems. For the clinical and preclinical domain, completing requirements represented the highest stressor. The faculty domain followed by personal domain both recorded the least stressful factors. The data gathered was statistically analyzed using ANOVA to test the mean distinctions in the levels of stress between each year. Significant results were observed for almost all questions. The F-ratio displays the mean differences between the years ascendingly. Significant stressors for second and third year students were discovered to be completing requirements and having a clear remediation plan. Between second year and fourth year students as well as between second and fifth year students, the mean difference was significant for questions that represented the last domain (clinical and preclinical stressors) (Table 1). Statistical significance was observed between second and fifth year students with stress on meeting assignment deadlines, marital adjustment problems, and financial responsibilities. The main statistical significant areas between second and sixth year students were receiving criticism about performance, rules and regulations of the school, and attitudes of faculty toward students. Areas of significance between third and fourth year students were limited to discrimination due to class status or sexual orientation as well as to an improper exam schedule (Table 2). Most of the questions included in the fourth domain constituted the main significant difference between third and fifth year students, particularly stress about meeting assignment deadlines and apprehension about failing a course (Table 3). On the other hand, third and sixth year students' areas of significance were limited to proper feedback from staff, grade distribution and all questions under the clinical and preclinical domain. In the more senior classes, fourth and fifth year students showed significant differences in responses to meeting school's infection control policies, inadequate instructor/student ratio and apprehension about failing a course (Table 4). Moreover, fourth and sixth year students' mean difference was found significant for examination styles (MCQ/written) and staff availability during office hours. Finally, the impact of cheating on good students depicted a significant difference only between fifth and sixth year students (Table 5). A paired T-test (P value <0.05) was used to compare male and female grades between the first and second semester in order to evaluate performance improvement or under performance. The results recorded a statistically significant difference regarding improvement between the second and first semesters with a mean of 4.8 for the second semester and 4.06 for the first semester, despite the H0 that expected higher scores in the first term as compared to H1.

Discussion

Stress in dental education is multifactorial since it includes both mental and physical efforts. The scope of the present study was based on evaluating the effect of stress on clinical and preclinical dental students' performance among Saudi dental students in the Faculty of Dentistry at King Abdulaziz University. Several studies concerned with the influence of stress on students used the DES to evaluate their work. In the present study, DES was also used as our evaluation tool. However, Sanders et al. (2002) advocated that the DES had some limitations, such as being a poor prognosticator of academic performance relating to the students' psychomotor performance [3]. Our study design was based on a cross-sectional study since it reflects the current situation of the students and allows for comparison between different groups. In addition, multiple exposures and outcomes can be measured; however, its limitation lies with the difficulty in determining whether the results are based upon the exposure or the outcome. Our present results demonstrated a prevalence of stress among most of the students, as a common existing factor due to their heavy academic load. This was comparatively explained in a similar study carried out by Al Samadani et al. (2013) in which they attributed their findings to the fact that our current dental medicine and surgery degree at KAUFD requires six years for completion. The first year includes preparatory courses in general science; the second and third years are mainly preclinical,

Table 1: Percentage distribution of responses (clinical and preclinical domain).

S.No	Sources of stress	Score 1		Score 2		Score 3		Score 4		Score 5	
		N	% of Total	N	% of Total	N	% of Total	N	% of Total	N	% of Total
1	Number of study problems.	11	4.40%	31	12.40%	73	29.20%	62	24.80%	73	29.20%
2	Having a lecture, clinical or laboratory session immediately before an exam on its scheduled day.	19	7.60%	31	12.40%	44	17.60%	71	28.40%	85	34.00%
3	Overloaded feeling due to heavy syllabus.	14	5.60%	16	6.40%	52	20.80%	65	26.00%	103	41.20%
4	Improper exam schedule.	21	8.40%	25	10.00%	71	28.40%	59	23.60%	74	29.60%
5	Examination styles (HCQ/written).	21	8.40%	46	18.40%	75	30.00%	59	23.60%	49	19.60%
6	Impact of cheating on good students.	62	24.80%	47	18.80%	66	26.40%	32	12.80%	43	17.20%
7	Apprehension about failing a course.	27	10.80%	36	14.40%	82	32.80%	44	17.60%	61	24.40%
8	Grade distribution.	18	7.20%	33	13.20%	74	29.60%	65	26.00%	60	24.00%
9	Meeting school's infection control policies.	64	25.60%	39	15.60%	62	24.80%	44	17.60%	41	16.40%
10	Clear remediation plan.	40	16.00%	39	15.60%	76	30.40%	52	20.80%	43	17.20%
11	Amount of assignments *vs*. time frame.	26	10.40%	24	9.60%	66	26.40%	60	24.00%	74	29.60%
12	Inter/Intra instructor inconsistency.	40	16.00%	23	9.20%	74	29.60%	53	21.20%	60	24.00%

Table 2: Mean scores of DES by year of study and relationship of mean scores between the years (ANOVA) (personal domain).

S.No	Sources of stress	Sig. level F ratio	(2,3)	(2,4)	(2,5)	(2,6)	(3,4)	(3,5)	(3,6)	(4,5)	(4,6)	(5,6)
1	Relationships with other members of the class.	0.7549	0.4969	0.235	0.6239	0.8645	0.6666	0.808	0.563	0.459	0.257	0.716
2	Neglect of personal life due to time factors.	0.2174	0.915	0.076	0.141	0.8038	0.1173	0.203	0.908	0.722	0.088	0.171
3	Having children at home.	0.4427	0.801	0.307	0.5519	0.39	0.4794	0.413	0.597	0.096	0.803	0.12
4	Marital adjustment problem.	0.0572	0.2143	0.332	0.0065*	0.0226*	0.728	0.199	0.431	0.076	0.206	0.529
5	Financial responsibilities.	0.0982	0.1405	0.654	0.0218*	0.0453*	0.2821	0.526	0.786	0.061	0.121	0.658
6	Personal physical health.	0.1052	0.0361*	0.071	0.4681	0.0260*	0.6681	0.135	0.843	0.251	0.776	0.124
7	Your expectation of professional school versus reality.	0.8915	0.9027	0.759	0.5269	0.4531	0.6793	0.471	0.406	0.746	0.67	0.931
8	Lack of confidence in career decision.	0.1768	0.5024	0.117	0.5413	0.0261*	0.4245	0.904	0.176	0.31	0.584	0.962
9	Family obligation.	0.5545	0.9168	0.231	0.5939	0.2282	0.2173	0.543	0.216	0.479	0.927	0.499
10	Discrimination due to class status, or sexual orientation.	0.1419	0.1143	0.474	0.3482	0.2663	0.0233*	0.449	0.497	0.09	0.055	0.898

*Significant difference compared to control (P<0.05)

while the fourth, fifth and sixth years are clinical and competency based. Stress is spontaneously experienced through the heavy workload, variability and frequency of assessments [10]. However, a study conducted by Humphrison European dental schools in 2002 reported that only 20% of the undergraduate students exhibited stress [6]. Our sample size comprised 250 students of both genders from their second year to their sixth year. This size was randomly selected among responders exposed to the same study environment, material, staff, and curricula. This sample size is considered to Bea good reflection of our students according to the number of actually enrolled students. One of the main predictors of concern in this present study was the effect of Saudi family and community habits and traditions among Saudi students and its specificity in exerting pressure and stress as well as compromising their time. The results proved that although the question regarding family and obligation showed a high response rate, it was insignificantly associated with stress among both genders and study levels. In the present work, responses to stress in different domains varied according to gender; in general, females exhibited higher stress than males. Although this conforms to previous studies [11-16], our results reported more peculiarities toward special domains. While both genders experienced the same level of stress in personal and theoretical domains, males appeared more stressed in the clinical and preclinical domain, while females recorded more stress in the faculty domain. This situation could be interpreted as the social and cultural background influencing behaviors and values that decrease the female students' comfort in displaying assertiveness during their first acquaintance with this open social environment dealing with their staff and patients. The mean stress scores were observed to be in the ascending order across the advancing study years. This result could carry a multifactorial interpretation in agreement with previous research [7,11,13]since the first three years are mainly introductory, preparatory and preclinical relying on a didactic curriculum with

Table 3: Mean scores of DES by year of study and relationship of mean scores between the years (ANOVA) (theoretical domain).

S.No	Sources of stress	Sig. level F ratio	(2,3)	(2,4)	(2,5)	(2,6)	(3,4)	(3,5)	(3,6)	(4,5)	(4,6)	(5,6)
1	Number of study problems.	0.3051	0.533	0.438	0.3279	0.5434	0.1737	0.1186	0.9126	0.851	0.1414	0.0862
2	Having a lecture, clinical or lab session immediately before an exam on its scheduled day.	0.5517	0.969	0.406	0.2392	0.1714	0.4573	0.2871	0.2174	0.7397	0.6307	0.8938
3	Overloaded feeling due to heavy syllabus.	0.904	0.488	0.39	0.415	0.6494	0.9151	0.9623	0.7424	0.9468	0.6284	0.6706
4	Improper exam schedule.	0.1627	0.075	0.521	0.4301	0.4648	0.0164*	0.2692	0.2106	0.1418	0.1471	0.9153
5	Examination styles HCQ/ written).	0.0871	0.053	0.798	0.1847	0.0247*	0.085	0.4462	1	0.2784	0.0442*	0.3693
6	Impact of cheating on good students.	0.2113	0.241	0.505	0.8612	0.0738	0.5728	0.1683	0.691	0.3835	0.2743	0.0389*
7	Apprehension about failing a course.	0.0024*	0.677	0.56	0.0981	0.0090*	0.8998	0.0476*	0.0040*	0.0224*	0.0010*	0.3572
8	Grade distribution.	0.0159*	0.72	0.678	0.2156	0.0188*	0.9787	0.1256	0.0100*	0.0912	0.0045*	0.2693
9	Stress on meeting deadlines.	0.0025*	0.22	0.158	0.0394*	0.0204*	0.0105*	0.0015*	0.0005*	0.5276	0.4127	0.876

*Significant difference compared to control (P<0.05)

Table 4: Mean scores of DES by year of study and relationship of mean scores between the years (ANOVA) (faculty domain).

S.No	Sources of stress	Sig. level F ratio	(2,3)	(2,4)	(2,5)	(2,6)	(3,4)	(3,5)
1	Learning environment created by faculty.	0.3722	0.757	0.716	0.689	0.1844	0.978	0.486
2	Receiving criticism about performance.	0.0093*	0.966	0.701	0.054	0.0046*	0.686	0.064
3	Rules and regulations of the school.	0.0013*	0.53	0.398	0.309	0.0072*	0.874	0.109
4	Attitudes of faculty toward students.	0.0699	0.755	0.341	0.216	0.0081*	0.561	0.401
5	Staff availability during office hours.	0.0165*	0.499	0.794	0.253	0.0064*	0.352	0.71
6	Proper feedback from staff.	0.0028*	0.445	0.35	0.074	0.0003*	0.917	0.372

*Significant difference compared to control (P<0.05)

limited laboratory work; on the other hand, the academic load in the last years is both clinical and didactic competency based within a highly competitive environment that exerts additional stress. Among the most significant stress factors were heavy syllabi, meeting assignment deadlines and completing clinical requirements, these were found in accordance with similar work conducted by Al-Sowygh et al. and Al-Samadani et al. [10,11]. The least stressful factors in this study were limited to rules and regulations of the school, proper feedback from staff, staff availability during office hours and attitudes of faculty toward students, which was found consistent with other studies conducted at the Faculty of Dentistry at King Saud University [11]. However, contradictory results were obtained in Malaysia where personal physical health and lack of home atmosphere in living quarters proved to be the least stressful factors [17]. Based upon our results, stress did not affect students' academic performance throughout the advancing years in their performance showed ascending improvement. This result could be attributed to our curriculum that shifted from traditional didactic teaching to a problem based learning style. Our results align with Rajab who attributed his result of high stress on the influence of students' performance to traditional didactic teaching [18].

Conclusion

Grade improvement throughout the academic year among our students, despite the proportional increase in stress, reflects higher motivation and confidence as well as gaining and compiling didactic knowledge and cognitive skills through our evidence based and patient centered curriculum enhancing the students' critical thinking and higher clinical skills. The cornerstone of improvement and creating a better pedagogic environment with a minimum amount of stress experienced by our students depends on the dynamic between an ever-evolving curriculums centered on the integration of knowledge to cognitive abilities. However, it is highly recommended to implement a stress management protocol into our reforming curricula.

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