

## Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

Journal home page: [www.jamdsr.com](http://www.jamdsr.com)

doi: 10.21276/jamdsr

Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599;

(p) ISSN Print: 2348-6805

### Original Research

#### The effect of physical exercises on dental students' stress

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#### ABSTRACT:

**Aim:** The aim of this study is to evaluate the effect of physical exercises on dental students' stress. **Materials and Methods:** A cross-sectional online survey was conducted among undergraduate dental students at Riyadh Elm University and from various dental colleges in Riyadh, Kingdom of Saudi Arabia (KSA). The major focus of the questioner was to compare the stress levels of students who practice physical exercise, and those who do not. Data collected were analyzed using the Statistical Package for the Social Sciences (Version 23.0, SPSS, Chicago, IL, USA). **Results:** Over half of the respondents reported they do not exercise. Most of the respondents reported that they would like exercise. The most stress-provoking domain was "workload" with a score of  $2.69 \pm 1.05$  followed by "self-efficacy beliefs" which scored  $2.57 \pm 0.76$  and "faculty and administration". Students who did not practice physical exercise scored higher stress than those who did in all domains and items with significant differences in "patient treatment" domain ( $p < 0.05$ ) and "patient being late or not showing for their appointments" item ( $p < 0.05$ ). **Conclusions:** In conclusion, the majority of the students don't know the benefit of exercise in reducing stress. Most of the reasons that caused stress among dental students were the workload. Moreover, students who don't practice a physical exercise were more stressed than students who exercise regularly.

**Keywords:** Stress, Dental student, Exercise.

Received: 12May, 2020

Accepted: 28 May, 2020

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**This article may be cited as:** Ahmed YT, Alghamdi SJ, Alruwayhi SA, Alsaggabi AS, Alhokair AF. The effect of physical exercises on dental students' stress. J Adv Med Dent Sci Res 2020;8(6):11-17.

#### INTRODUCTION

Stress is simply defined as a strain that accompanies a demand perceived to be either challenging (positive) or threatening (negative) and, depending on the appraisal, either adaptive or debilitating.<sup>1</sup> The stressful nature of dentistry starts early as dental students are expected to acquire a wide range of knowledge and a variety of skills to help them succeed in their studies, and also in their future career<sup>2</sup> and this may predispose them to professional burnout and decreased productivity.<sup>3</sup> Symptoms of distress include anxiety, depression, phobia, hostility, fear and tension, as well as physical complaints such as sleeplessness, fatigue, dizziness, tachycardia, and gastrointestinal system distress.<sup>4</sup> However, multiple studies have found significantly high-stress levels in medical students and the high stress

has been reported from multiple countries, spanning different continents.<sup>5</sup> Moreover, multiple studies have also reported high levels of stress in health care profession students<sup>6</sup> and medical students have been reported to have a considerable amount of stress.<sup>7</sup> Multiple studies have shown that mental health issues among college students are a growing public health concern, and this finding is highly alarming. The increasing rates of depression, anxiety and stress tend to interfere with their quality of life and educational attainment.<sup>8</sup> "Physical fitness is the first requisite of happiness. Physical activity is a global term that is defined as "any bodily movement produced by skeletal muscle that results in a substantial increase over the resting energy expenditure physical inactivity or sedentary lifestyle."<sup>9</sup> Apart from its role in development

of functional qualities like aerobic capacity, flexibility, muscle strength and motor skills, regular physical activity has a protective effect on a whole lot of health conditions from cardiovascular diseases to cancer.<sup>10</sup> Numerous studies have been conducted on the benefits of physical activity on mental health, and the majority of these studies highlight that those who engage in physical activity tend to have fewer stress symptoms compared to those who lead a more sedentary lifestyle.<sup>11-12</sup> Dentistry students' schedules are busy and many feel overloaded attending lectures and clinical sessions during the week while working on their assignments, meeting deadlines and studying over the weekends, which leaves little or no time for them to practice their hobbies or exercise regularly. In addition, intense interaction between dental students and their patients eventually leads to a state of 'burnout' that consists of emotional exhaustion, depersonalization, and reduced personal accomplishment, numerous studies have been conducted through surveys using the Dental Environment Stress (DES) Questionnaire and have shown significant increase of stress amongst dental students.<sup>13</sup> The literature also reveals that physical and psychosocial stressors in dental schools are associated with adverse health outcomes.<sup>14</sup> Based on the review by Alzahem et al., there were five major causes of stress affecting dental students: (i) living accommodation factors, (ii) personal factors, (iii) educational environment factors, (iv) academic factors, and (v) clinical factors. Furthermore in clinical years the need to meet clinical requirements was the most significant cause of stress, in addition to passing strict academic assessments, and interacting with clinical and supporting staff. Additionally, clinical years were found to be more stressful than the pre-clinical years and instructors themselves frequently created more stress than the treatment of patients.<sup>13</sup> The aim of this study is to evaluate the effect of physical exercises on dental students' stress.

## METHODS

Following a comprehensive literature review, the questionnaire was designed and used for data collection. A cross-sectional online survey was conducted for three months (September-November 2019) to 24 males and 107 female undergraduate dental students at Riyadh Elm University in the 4<sup>th</sup> to 6<sup>th</sup> years and the 4<sup>th</sup> to 5<sup>th</sup> years from various dental colleges in Riyadh, Kingdom of Saudi Arabia (KSA). The major focus of the questioner was to compare the stress levels of students who practice physical exercise, and those who do not. The students answered 29 questions, where 11 of them were self-administered, while the others followed the dental environment stress questionnaire; DES and modified DES questionnaire.

Initially, the participants have answered inquiries about the demographic information (academic year, age, and gender, name of the University). Following this, an information about the physical fitness have been questioned. Then, they provided a feedback about their personal emotional states based on the academic success and the fear of failure while dealing with patients. The way of responding to the faculty members were required as well. Participation was voluntary; all information remained confidential. The study design was reviewed and approved by the institutional ethics committee of all schools. Institutional Review Board; IRB approval (RC/IRB/2019/279) was obtained at Riyadh Elm University, while the registration number was FUGRP/2019/59. Data collected were analyzed using the Statistical Package for the Social Sciences (Version 23.0, SPSS, Chicago, IL, USA). Descriptive analysis were performed to present the overview of the findings. All p-values  $\leq 0.05$  were considered statistically significant.

## RESULTS

Two hundred questionnaires were distributed among 4<sup>th</sup> to 6<sup>th</sup> year dental students in Riyadh city, KSA and 131 were returned giving a response rate of 65.5%. Table 1 shows demographic characteristics of the respondents. Most of the respondents were female (81.7%), aged between 18-24 years (61.1%), studying in Riyadh Elm University (63.6%), and in 6<sup>th</sup> academic year (70.2%). Figure 1 shows the perceived source of stress reported by the respondents. With regard to the total sample, "fear of dealing with patients who do not disclose the existence of a contagious disease" (90.1%), "insecurity concerning lack of employment position" (89.3%), and "shortage of allocated clinical time" (89.3%) were the top three perceived sources of stress.

Figure 2 shows distribution of body mass index with just over half (52.7%) the respondents reported normal (18.5-22.9). Over half (54.2%) of the respondents reported they do not exercise. Most of the respondents (91.4%) reported that they would like exercise. Two-third (66.7%) prefer to exercise alone, 53.8% exercise prior to being in dental school, 70% exercise without a coach or under a professional advice, 56.4% do not exercise during their menstrual cycle, 28.2% workout thrice a week, 27.3% do walking type of workout, 33.1% feel refreshed after exercise, and 38.4% reported that health motivates them to exercise (Table 2).

The most stress-provoking domain was "workload" with a score of  $2.69 \pm 1.05$  followed by "self-efficacy beliefs" which scored  $2.57 \pm 0.76$  and "faculty and administration" which scored  $2.51 \pm 0.79$ , whilst "patient treatment" and "clinical training" domain were the lowest stressor with a score of  $2.47 \pm 0.76$  and  $2.45 \pm 0.83$  respectively. Score of stress level (Mean  $\pm$  SD) according to each domain and the related questions are

shown in Table 3. Students who did not practice physical exercise scored higher stress than those who did in all domains and items with significant differences

in “patient treatment” domain ( $p=0.039$ ) and “patient being late or not showing for their appointments” item ( $p=0.015$ ) (Table 4).

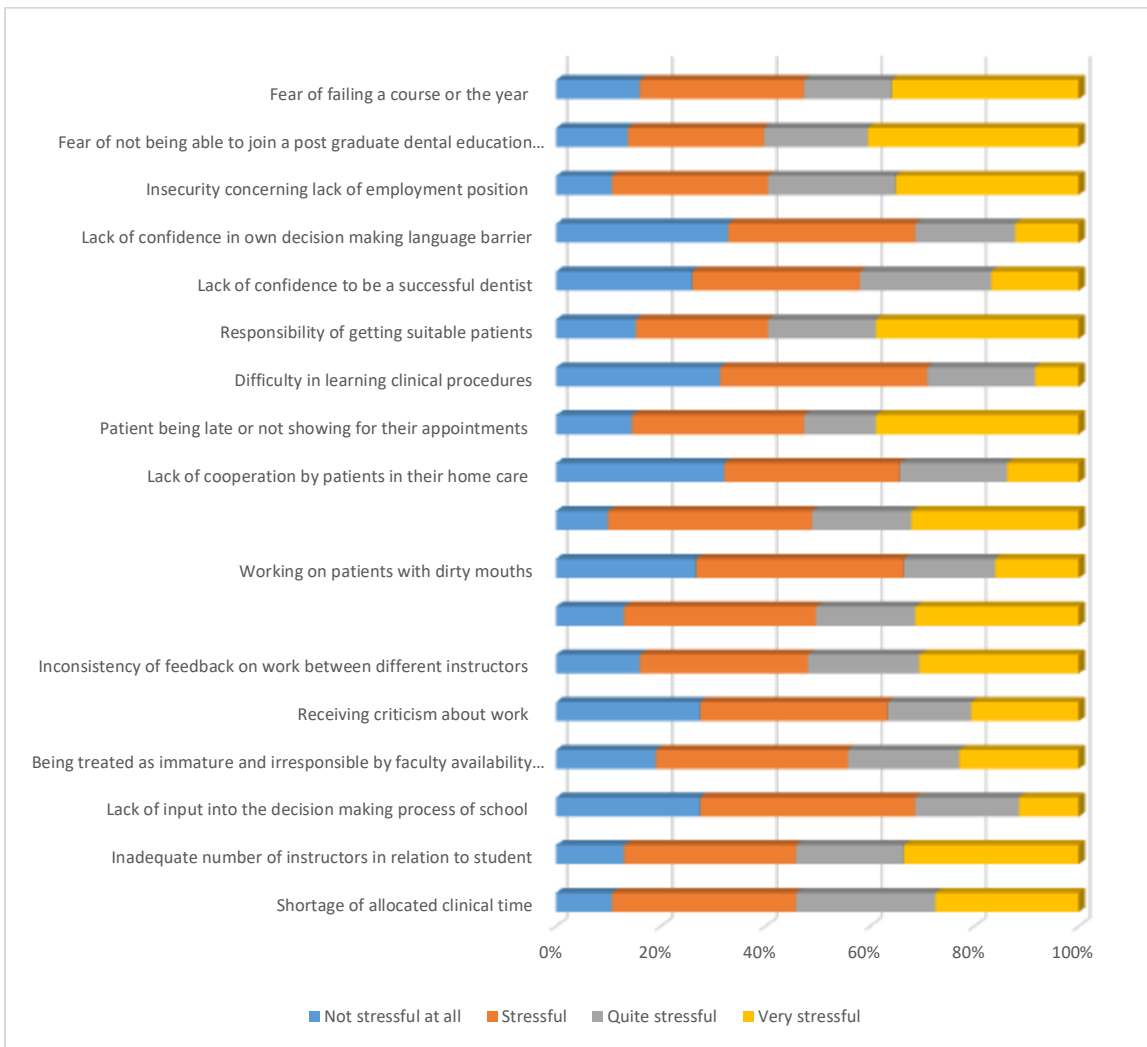


Figure 1: Perceived source of stress

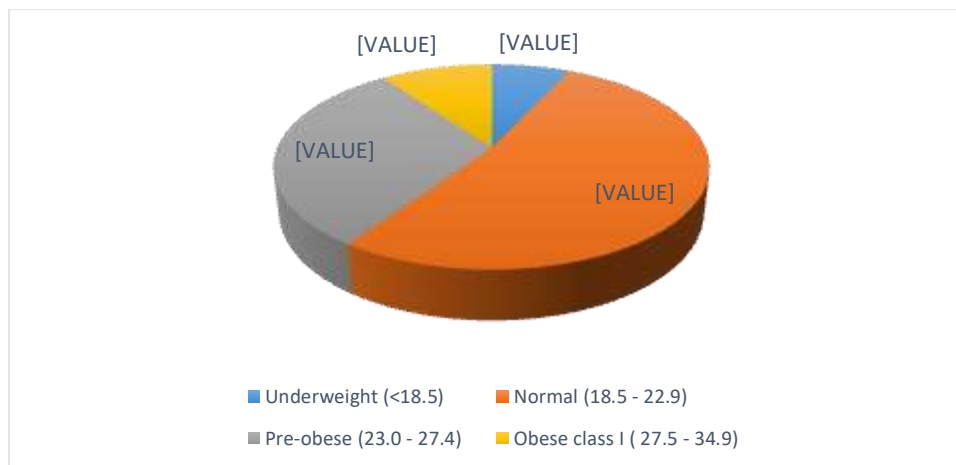


Figure 2: Body mass index (BMI)

**Table 1. Demographics**

		n (%)
<b>Gender</b>	Male	24 (18.3)
	Female	107 (81.7)
<b>Age</b>	18-24 years	80 (61.1)
	25-30 years	49 (37.4)
	31-35 years	0 (0.0)
	>35 years	2 (1.5)
<b>University</b>	King Saud University (KSU)	2 (4.5)
	King Saud Bin Abdulaziz University for Health Sciences (KAU-HS)	1 (2.3)
	Riyadh Elm University (REU)	28 (63.6)
	Alfarabi Colleges	8 (18.2)
	Others	5 (11.4)
<b>Academic years</b>	4 <sup>th</sup>	14 (10.7)
	5 <sup>th</sup>	25 (19.1)
	6 <sup>th</sup>	92 (70.2)

**Table 2. Physical exercise**

		n (%)
<b>Do you exercise?</b>	Yes	60 (45.8)
	No	71 (54.2)
<b>Even you do not currently exercise, would you like to exercise?</b>	Yes	117 (91.4)
	No	11 (8.6)
<b>Do you prefer to exercise alone?</b>	Yes	86 (66.7)
	No	43 (33.3)
<b>Did you exercise prior to being in dental school?</b>	Yes	70 (53.8)
	No	60 (46.2)
<b>Do you exercise with a coach or under a professional advice?</b>	Yes	39 (30.0)
	No	91 (70.0)
<b>Do you exercise during your menstrual cycle?</b>	Yes	51 (43.6)
	No	66 (56.4)
<b>Frequency of workout per week</b>	Once	9 (6.9)
	Twice	16 (12.2)
	Thrice	37 (28.2)
	Daily	26 (19.8)
	None of the above	43 (32.8)
<b>Type of workout</b>	Jogging	8 (6.6)
	Pilates	8 (6.6)
	Aerobics	15 (12.4)
	Walking	33 (27.3)
	Swimming	11 (9.1)
	Football	2 (1.7)
	Basketball	1 (0.8)
	Tennis	1 (0.8)
	Others	42 (34.7)
<b>How do you feel after exercise?</b>	Refreshed	40 (33.1)
	Tired	20 (16.5)
	Relaxed	14 (11.6)
	Energetic	26 (21.5)
	Fulfilled	21 (17.4)
<b>What motivates you to exercise?</b>	Appearance	37 (29.6)
	Health	48 (38.4)
	Friends	4 (3.2)
	Self esteem	27 (21.6)
	Others	9 (7.2)

**Table 3. Dental environment stress score**

Domain	Item	Mean±SD
<b>Self-efficacy beliefs</b> (Mean±SD=2.57±0.76)	Fear of failing a course or the year	2.73±1.12
	Fear of not being able to join a post graduate dental education program	2.87±1.10
	Insecurity concerning lack of employment position	2.84±1.03
	Lack of confidence in own decision-making language barrier	2.11±1.00
	Lack of confidence to be a successful dentist	2.33±1.04
<b>Clinical training</b> (Mean±SD=2.45±0.83)	Responsibility of getting suitable patients	2.83±1.11
	Difficulty in learning clinical procedures	2.06±0.93
<b>Patient treatment</b> (Mean±SD=2.47±0.76)	Patient being late or not showing for their appointments	2.77±1.12
	Lack of cooperation by patients in their home care	2.16±1.03
	Fear of dealing with patients who do not disclose the existence of a contagious disease	2.73±1.02
	Working on patients with dirty mouths	2.23±1.02
<b>Workload</b> (Mean±SD=2.69±1.05)	Over loaded feeling due to huge syllabus lack of time to do assigned schoolwork	2.69±1.05
<b>Faculty and administration</b> (Mean±SD=2.51±0.79)	Inconsistency of feedback on work between different instructors	2.66±1.08
	Receiving criticism about work	2.30±1.09
	Being treated as immature and irresponsible by faculty availability of qualified laboratory technicians	2.50±1.05
	Lack of input into the decision-making process of school	2.15±0.96
	Inadequate number of instructors in relation to student	2.75±1.06
	Shortage of allocated clinical time	2.71±0.99

**Table 4. Comparison of dental environment stress score with physical exercise practice**

Domain	Item	Do you exercise?		p value
		Yes	No	
		Mean±SD		
<b>Self-efficacy beliefs</b>	Fear of failing a course or the year	2.72±1.17	2.73±1.08	0.948
	Fear of not being able to join a post graduate dental education program	2.82±1.05	2.92±1.14	0.538
	Insecurity concerning lack of employment position	2.70±0.98	2.96±1.06	0.123
	Lack of confidence in own decision-making language barrier	2.08±0.98	2.13±1.03	0.848
	Lack of confidence to be a successful dentist	2.30±1.03	2.35±1.06	0.799
<b>Clinical training</b>	Responsibility of getting suitable patients	2.77±1.09	2.89±1.13	0.483
	Difficulty in learning clinical procedures	2.08±1.03	2.04±0.84	0.909
<b>Patient treatment</b>	Patient being late or not showing for their appointments	2.52±1.07	2.99±1.13	0.015*
	Lack of cooperation by patients in their home care	2.08±1.00	2.23±1.06	0.475
	Fear of dealing with patients who do not disclose the existence of a contagious disease	2.55±0.97	2.89±1.05	0.063
	Working on patients with dirty mouths	2.17±0.96	2.28±1.07	0.630
<b>Workload</b>	Over loaded feeling due to huge syllabus lack of time to do assigned schoolwork	2.50±1.02	2.85±1.06	0.060
<b>Faculty and administration</b>	Inconsistency of feedback on work between different instructors	2.57±1.13	2.75±1.04	0.358
	Receiving criticism about work	2.17±1.04	2.41±1.12	0.224
	Being treated as immature and irresponsible by faculty availability of qualified laboratory technicians	2.30±0.91	2.63±1.14	0.090
	Lack of input into the decision-making process of school	1.98±0.83	2.30±1.03	0.099
	Inadequate number of instructors in relation to student	2.58±1.01	2.89±1.09	0.093
	Shortage of allocated clinical time	2.53±0.91	2.86±1.03	0.059

\* Statistically significant at p<0.05

## DISCUSSION

Dental students have a 100% prevalence of stress<sup>15</sup>, this significantly high prevalence level results from the constant pursuit of perfection because of their previous excellent and high achievement schooling background; hence excellence is the norm among dental students.<sup>16</sup> These findings were reflected in our study as self-efficiency beliefs especially 'fear of failure of course or year' scored highest among all the stressors in the self-efficiency category. This was reflected in our study as we found that dental students were suffering from stress with female more stressed than males.

We also found that the average scores of problem based coping strategies in athletic students were higher than those of non-athletic ones in agreement with a study by Azizi (2011)<sup>17</sup>, the average of the athletic was 15.17 and non-athletic 7.74. While the average scores of emotion based coping strategies, non-athletic students were higher than those of the athletic ones. The final result of this study showed the stress among non-athletic students was more than the stress among athletic students. In another study tackling stress among undergraduate dentistry students they have found that, first year students found the difficulty of class work (80%) more stressful than the clinical year student.<sup>18</sup>

A pervious study showed female students were 40% more than their male students in facing difficulty of class work items, in addition female students felt more stressed in comparison to their male colleagues about the fear of failing the course or the year.<sup>19</sup> Based on our results the most stressful year was the third year, students reported highest stress levels. Male students were less stressed in learning clinical procedures and protocols compared to female students. Also the fourth year was the least stressful year compared with the entering year students around 80 %. However, clinical year students were the most stressed students when it came to their insecurity regarding professional future and patients being late or not showing up for their appointments.

In our study, the main stressors were related to workload as well as examination and grades, which is similar to previous study by Elani et.al. (2013) which was conducted on Canadian dental students to evaluate sources of stress.<sup>20</sup> In addition, Sghaireen et al. in 2013 showed a high-anxiety responses to dental procedures, and female dental students were more anxious than males.<sup>21</sup>

The most liked type of workout by dental students was walking and the least were playing basketball and tennis. The result of what they feel after exercising refreshed compared to other choices had the highest percentage. Health was the most reason that motivate dental student to exercise with 48 (38.4%). In the part of the dental environment stress, workload was the highest with a score of  $2.69 \pm 1.05$  followed by "self-

efficacy beliefs" which scored  $2.57 \pm 0.76$  and "faculty and administration" which scored  $2.51 \pm 0.79$ . While "patient treatment" and "clinical training" domain was the lowest stressor with a score of  $2.47 \pm 0.76$  and  $2.45 \pm 0.83$  respectively. The result of stress in the students who exercise was less compared to the students who don't exercise.

One study discussed the current literature indicating elevated levels of stress among dental students due to academic and clinical dental training. And these stressors have an impact on dental student's academic performance, physical health status, and psychological well-being.<sup>20</sup>

Another study showed that females are more effected by stress than male, because males tend to engage in physical activities, and distracting coping.<sup>22</sup>

Findings of previous studies indicated that sources of elevated stress levels among dental students is due to performance pressure, workloads, and self-confidence.<sup>15,19,23-25</sup> Physical activities are the most commonly effective method.<sup>26</sup> Physical activities can reduce stress by its a positive impact and a buffering method. Individuals who do not perform any sort of physical activities tend to have higher stress levels, and are at risk of having obesity and other health problems.<sup>27-28</sup> One of the limitation of our study was a small sample size.

## CONCLUSION

In conclusion, the majority of the students don't know the benefit of exercise in reducing stress. Most of the reasons that caused stress among dental students were the workload. Moreover, students who don't practice a physical exercise were more stressed than students who exercise regularly.

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