

# Effect of a Brief Intervention Program on Burnout among Medical Students at Faculty of Medicine in Suez Canal University, Egypt

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## Abstract

**Background:** Studies revealed that stress and burnout developed in medical students during their academic learning years, progress throughout their clinical years, and proceed in their practice as physicians. This can negatively impact their learning abilities, and mental, cognitive, and physical health. Therefore, effective programs are needed to assure medical students' well-being and to prevent negative consequences of burnout and stress related to medical training.

**Aim:** This study was aiming to improve the provided care to medical students by improving their mental and psychological health by providing baseline information on the prevalence of stress and burnout and by conducting an interventional program to reduce them. **Methods:** A randomized controlled trial was conducted on medical students in the Faculty of Medicine, Suez Canal University, Egypt. Socio-demographic questionnaire was used to collect data in addition to the Maslach Burnout Inventory-Student Survey (MBI-SS) to measure burnout, and the General Health Questionnaire-12 (GHQ-12) to measure stress. The intervention group and control group contained 50 students per each, where randomization was done using the computerized method. The program was a 3-day workshop with a post-test followed it by 1 month. **Results:** The prevalence of stress among students was 51%, while that of burnout was 43%. After implementing the program there was a significant improvement in the scores of emotional exhaustions (EE), academic performance domain of burnout, and GHQ-12 among the intervention group. **Conclusion:** Brief intervention programs can help students to cope with their stress leading to significant improvements and a decrease in the prevalence of burnout among them.

**Keywords:** Burnout, stress, medical students

## Introduction

Studies have revealed that the prevalence of psychological distress among medical students is 15-19% higher than in the general population and age-matched peers<sup>(1)</sup>. Burnout and stress are symptomatically close, with burnout attributed mainly to

occupational stressors. It was proposed that there is a cyclical relationship between EE and stress, which suggest that increasing levels of stress and poor coping strategies may be the main contributors to developing burnout<sup>(2)</sup>. Health-related occupations, including physicians, are very stressful leading to the development of

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Burnout, which was assumed to start earlier during medical school<sup>(3)</sup>. Several studies revealed that stress and burnout developed in medical students during their academic learning years, progress throughout their clinical ones, and proceed in their actual practice as physicians<sup>(4)</sup>. A study was conducted in Sweden on more than 1000 students who developed Burnout in their academic years, where they were followed up after their graduation by one year found that their capability to do their jobs or to research was lessened, moreover; they showed more tendencies to leave their jobs<sup>(5)</sup>. Medical students also must face the challenge of their continuous need for knowledge, research, and acquiring new skills. Then applying this knowledge in reality with patients where they asked to be creative in solving the faced problems in their institutions, which may be far from the ideal form which they studied<sup>(6)</sup>. In addition, the continuous change in the work habits during the educational year and the long duration of studying make students more vulnerable to developing Burnout<sup>(7)</sup>. Being highly challenging, stressful, usually dominating the lives, studying medicine and developing Burnout can negatively impact the mental health, cognitive function and learning abilities of medical students as well as their physical health<sup>(8)</sup>. It is estimated that about 11% of medical students use psycho stimulants, which is much higher than their peers in the general population<sup>(9)</sup>. Negative impacts of Burnout are not restricted to the individual, it extends to the social, family, and professional levels, affecting the educational process in a direct way<sup>(10)</sup>. Academic burnout was found to cause odd behaviors like refusing to do tasks and imprudence in dealing with professors, making it unsurprisingly to have physicians ex-

pressing no attention to patient care in the clinical setting when they start their career<sup>(5)</sup>. Therefore, developing an effective intervention program to deal with this problem with its negative consequences is crucial for medical students and the sake of the patients and their safety in the future, as well<sup>(11)</sup>. This study was conducted to provide baseline information on burnout among Egyptian medical students and to measure the effect of a brief stress reduction educational program on them, aiming at improving their well-being, and preventing negative consequences of burnout and stress related to medical training.

## Subjects and Methods

*Study Design and Population:* This is a randomized control study that was conducted among medical students in the 2nd and 3rd years of faculty of medicine, at Suez Canal University in Egypt. We choose the students in these preclinical undergraduate years to intervene early before they develop higher levels of burnout as they process through their clinical overwhelming ones. They were of the same years to ensure matching characteristics on distributing them into control and intervention groups.

*Inclusion and Exclusion criteria:* Students of the 2nd and 3rd years in the faculty of Medicine, Suez Canal University, Egypt, who accepted to participate in the study were included. We excluded students with known psychiatric disorder, or those who received training programs related to burnout in the previous 6 months.

*Sampling and Sampling technique:* The required sample size was calculated and found to be approximately equal to 41 students per group, and considering a

dropout rate of 20%, the total sample size required was 50 students per group<sup>(12,13)</sup>. At first, the total study participants (n=100) were selected randomly from the numerical list by a simple random sampling technique. Then random allocation into groups was done. The study included two groups control (n=50) and intervention (n=50). The study participants were randomly allocated into two study groups by a simple random sampling technique. Every participant had an equal chance to be included in any of the study groups.

#### *Study Tools*

*Socio-demographic data:* including age, gender, marital status of the parents, academic grades, regularity of attending the academic course, smoking, drug intake, and presence of social, financial, or physical problems.

#### *Measuring Burnout*

It was measured using MBI-SS which is an adapted validated self-administered inventory that was designed to measure the burnout level of students<sup>(14)</sup>. The MBI-SS consists of 15 questions measuring three subscales: emotional exhaustion (5 items), cynicism (4 items), and academic efficacy (6 items). All items were assessed by frequency using the following Likert scale (0-6): 0 (never), 1 (once a year or less), 2 (once a month or less), 3 (a few times a month), 4 (once a week), 5 (a few times a week), and 6 (every day). A participant was considered to meet the study criteria for burnout if he or she got a "high" score on at least 2 of the three dimensions of MBI. High scores were demonstrated for each domain as; >14 for EE domain, >6 for cynicism, and <23 for academic efficacy<sup>(15)</sup>.

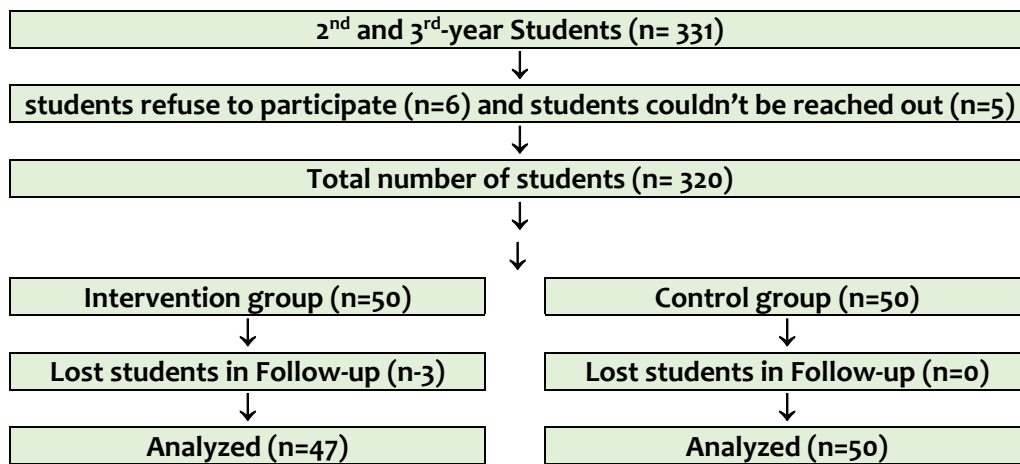
#### *Measuring stress*

Stress was measured by the GHQ-12 which is a self-report, validated tool that is used

to measure overall emotional wellbeing, and psychological stress. The scale asks whether the participants have recently experienced symptoms. Each item is rated on a four-point scale (less than usual, no more than usual, rather more than usual, or much more than usual). The scoring method in this study will be a binary scoring method (0, 0, 1, 1). Participants who scored 4 or more by this method are considered to have significant distress<sup>(13,16)</sup>.

#### *Data Collection*

After a letter of acceptance for the study was held from the Vice Dean of students' affairs, self-administrated socio-demographic data, MBI-SS, and GHQ-12 questionnaires were collected from all the students in the 2nd and 3rd years who participated in the study during their presence in lectures, classes or field training. All students in the 2nd and 3rd years were included except those who refused to participate and those who could not be reached, where the final number of participants was 320 students. The sample size of 100 students from those who were found to have burnout was selected randomly from the numerical list by a simple random sampling technique. Afterward, random allocation using a computerized simple random sampling technique was done to divide study participants into 2 groups; an intervention group who will join the program (n=50), and a control one who will not receive the program (n=50). Every participant had an equal chance to be included in any of the study groups. (Figure 1) The training program was provided to students in the intervention group where they were invited to participate in the workshop through a series of mailed, Facebook messages, and telephone calls from the researcher.



**Figure 1. Flowchart describing the number of sampling students and their follow-up**

*Description of the program:* The program is based on cognitive behavioral skills, relaxation techniques and self-awareness intervention to increase awareness of the participants' level of stress, the surrounding stressors, and how to cope with them. It was implemented as a 3-days workshop in the form of interactive sessions that were held by a multidisciplinary team of; a certified instructor in the area of human development, a consultant psychiatrist, and the main researcher.

*Objectives of the program:* i) To provide participants with information regarding burnout, its definition, sources, and symptoms. ii) Increase self-awareness concerning their stress, stressors and how to cope with. iii) Training the participants to deal with the negative thoughts that would exacerbate burnout. iv) Training the participants some relaxation techniques and encourage them to exercise daily. The students were followed up after the program through a private Facebook page for the attendance only, where the data of the workshop, videos to help them to practice relaxation techniques, direct connection with the workshop speakers was available. Finally, the levels of burn-

out were reassessed after one month for both groups.

*Outcome variables:* Levels of burnout, emotional wellbeing, and psychological stress.

### Statistical Analysis

The obtained data were coded, entered, and processed using Statistical Package of Social Science (SPSS) version 22 for analysis of the results. Level of significance selected for this study was 95% ( $p < 0.05$ ) (a confidence level of 95%). Tests of significance used in this study included: paired Student's t-test for continuous data, chi-square test for categorical data, multiple logistic regressions were used to identify predictors of burnout.

### Ethical Considerations

All procedures used in the study followed the ethical standards of the Ethics Research Committee of Faculty of Medicine Suez Canal University and the 1964 Helsinki declaration and its later amendments. The study was approved by the Ethics Committee of Faculty of Medicine, Suez Canal University, Egypt (Code 2863).

Informed consents were obtained from all participants. Consent for publication was

not applicable. The manuscript does not contain any personal data in any form.

<b>Table 1: Socio-demographic baseline characteristics of students (n= 320)</b>	
<b>Variables</b>	<b>n (%)</b>
<b>Age (years), mean ±SD</b>	19.49 ± 0.92
<b>Gender, n (%)</b>	
Male	128 (40)
Female	192 (60)
<b>Marital Status</b>	
Single	309 (96.6)
Engaged	11 (3.4)
<b>Marital status of the parents</b>	
Married	304 (95)
Separated	8 (2.5)
Divorced	8 (2.5)
<b>Academic Grades</b>	
Excellent	169 (52.8)
Very good	102 (31.9)
Good	40 (12.5)
Fair	9 (2.8)
<b>Regularity of attending the academic course</b>	
Regular	252 (78.8)
Not regular	68 (21.3)
<b>Smoking history</b>	10 (3.1)
<b>Illicit drug use</b>	9 (2.9)
<b>Practicing exercise</b>	150 (46.9)
<b>History of chronic disease or physical problems</b>	29 (9.1)
<b>Family history of chronic disease</b>	195 (60.9)
<b>Financial problems</b>	29 (9.1)
<b>Social problems</b>	50 (15.6)
<b>Hours of study/day, mean ±SD</b>	3.28 ± 1.48

Data are presented as number (%) or mean ±SD.

## Results

This study included 320 medical students, (females 60% and males 40%, with mean age of 19.4 years old). Socio-demographic data revealed that most of them were single (96.6%) with 95% have married parents and only 2.5% who have divorced or separated ones. About 79% mentioned that they attend their academic courses regularly, and more than half of them (52.8%) have excellent grades in their pre-

vious studying years (Table 1). On the other hand, the grades of the academic performance domain of burnout were nearly equivalent with total mean score  $25.29 \pm 6.31$  (Fig 2). Regarding the association between baseline data and burnout domains, we found that practicing exercise and having no social problems is associated with significant lower scores of emotional exhaustion & cynicism domains, and significant higher scores in academic performance one (Table 2).

Table 2: Association of baseline characteristics of students with domains of burn out (n= 320)						
Variables	Emotional mean $\pm$ SD	P value	Cynicism mean $\pm$ SD	P value	Academic mean $\pm$ SD	P value
<b>Gender</b>						
Male	16.49 $\pm$ 6.76	0.197 <sup>a</sup>	10.54 $\pm$ 7.26	0.8 <sup>a</sup>	24.91 $\pm$ 6.66	0.37 <sup>a</sup>
Female	17.52 $\pm$ 7.10		10.34 $\pm$ 6.59		25.55 $\pm$ 6.08	
<b>Marital Status</b>						
Single	17.21 $\pm$ 7.02	0.18 <sup>a</sup>	10.43 $\pm$ 6.85	0.87 <sup>a</sup>	25.27 $\pm$ 6.30	0.67 <sup>a</sup>
Engaged	14.36 $\pm$ 5.05		10.09 $\pm$ 7.56		26.09 $\pm$ 7.12	
<b>Parents marital status</b>						
Married	17.12 $\pm$ 6.95	0.97 <sup>b</sup>	10.39 $\pm$ 6.87	0.56 <sup>b</sup>	25.13 $\pm$ 6.38	0.119 <sup>b</sup>
Separated	17.25 $\pm$ 6.25		12.75 $\pm$ 7.01		28.00 $\pm$ 4.00	
Divorced	16.50 $\pm$ 9.24		9.25 $\pm$ 6.86		28.88 $\pm$ 4.16	
<b>Academic Grades</b>						
Excellent	17.39 $\pm$ 6.67	0.44 <sup>b</sup>	10.30 $\pm$ 6.69	0.039 <sup>b</sup>	25.54 $\pm$ 5.74	0.11 <sup>b</sup>
Very good	16.41 $\pm$ 7.06		9.54 $\pm$ 7.28		25.80 $\pm$ 6.34	
Good	18.10 $\pm$ 7.82		13.20 $\pm$ 6.09		23.05 $\pm$ 8.53	
Fair	15.33 $\pm$ 7.91		10.44 $\pm$ 6.09		24.89 $\pm$ 2.62	
<b>Attending the academic course</b>						
Regular	16.83 $\pm$ 6.84	0.167 <sup>a</sup>	9.69 $\pm$ 6.77	<0.001 <sup>a</sup>	25.99 $\pm$ 5.78	<0.001 <sup>a</sup>
Not regular	18.15 $\pm$ 7.40		13.13 $\pm$ 6.55		22.71 $\pm$ 7.50	
<b>Smoking history</b>						
Present	16.30 $\pm$ 7.80	0.71 <sup>a</sup>	9.70 $\pm$ 8.77	0.73 <sup>a</sup>	28.80 $\pm$ 6.60	0.07 <sup>a</sup>
Absent	17.14 $\pm$ 6.96		10.45 $\pm$ 6.81		25.18 $\pm$ 6.28	
<b>History of drugs</b>						
Present	16.56 $\pm$ 9.68	0.86 <sup>a</sup>	10.11 $\pm$ 9.40	0.89 <sup>a</sup>	30.44 $\pm$ 6.64	0.013 <sup>a</sup>
Absent	17.13 $\pm$ 6.90		10.43 $\pm$ 6.79		25.14 $\pm$ 6.25	
<b>Practicing exercise</b>						
Present	14.79 $\pm$ 6.08	<0.001 <sup>a</sup>	8.82 $\pm$ 6.57	<0.001 <sup>a</sup>	26.58 $\pm$ 4.98	<0.001 <sup>a</sup>
Absent	19.15 $\pm$ 7.09		11.84 $\pm$ 6.82		24.16 $\pm$ 7.12	
<b>History of chronic disease</b>						
Present	18.07 $\pm$ 6.95	0.435 <sup>a</sup>	10.45 $\pm$ 6.00	0.98 <sup>a</sup>	26.03 $\pm$ 5.17	0.51 <sup>a</sup>
Absent	17.01 $\pm$ 6.98		10.42 $\pm$ 6.95		25.22 $\pm$ 6.42	
<b>Family history of chronic disease</b>						
Present	17.27 $\pm$ 6.73	0.6 <sup>a</sup>	10.21 $\pm$ 6.90	0.49 <sup>a</sup>	25.42 $\pm$ 5.79	0.67 <sup>a</sup>
Absent	16.86 $\pm$ 7.35		10.75 $\pm$ 6.81		25.10 $\pm$ 7.08	
<b>Financial problems</b>						
Present	17.07 $\pm$ 7.55	0.97 <sup>a</sup>	11.66 $\pm$ 7.17	0.31 <sup>a</sup>	24.76 $\pm$ 7.64	0.63 <sup>a</sup>
Absent	17.11 $\pm$ 6.93		10.30 $\pm$ 6.83		25.35 $\pm$ 6.18	
<b>Social problems</b>						
Present	19.80 $\pm$ 6.77	0.003 <sup>a</sup>	12.16 $\pm$ 6.66	0.049 <sup>a</sup>	21.80 $\pm$ 7.40	<0.001 <sup>a</sup>
Absent	16.61 $\pm$ 6.91		10.10 $\pm$ 6.86		25.94 $\pm$ 5.88	

a= independent t-test, b= one-way ANOVA test. Statistical significance at  $p < 0.05$

On the other hand, those who regularly attended the academic courses had significant lower scores in cynicism domain and significant higher scores in academic performance one ( $P < 0.001$ ). Surprisingly, students with positive drug

history had significantly higher academic score ( $p = 0.013$ ). It was also found that all domains of burnout are associated with significant higher stress levels, which is represented in the higher scores of the GHQ ( $P < 0.001$ ) (Table 3). Forty-seven stu-

dents from intervention group and all the control group had continued the 3 days-workshop (total=97 students). Compari-

son of the baseline characteristics of both groups revealed no significant differences (Table 4).

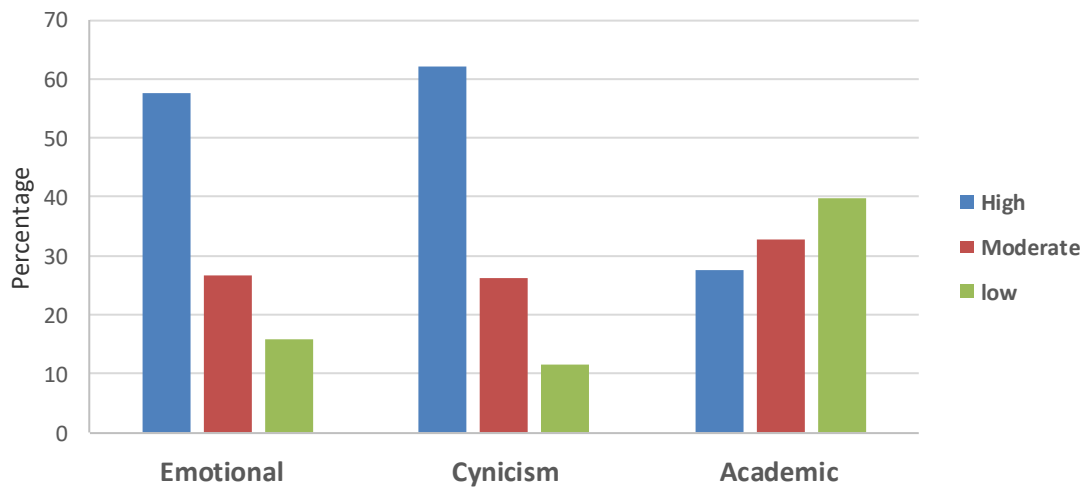


Figure 2: Grades of burnout domains

Variables	Emotional		Cynicism		Academic	
	R	p-value	r	p-value	r	p-value
General Health Questionnaire (GHQ)	0.37	<0.001	0.40	<0.001	-0.29	<0.001

R= Pearson's correlation coefficient. Statistical significance at  $p < 0.05$

Before implementing the program, there was no statistically significant difference between intervention and control groups among all burnout domains. However, after implementing the program, students in the interventional group have a significant lower score in the emotional exhaustion domain of the burnout than the control one ( $p=0.021$ ) and had a significant higher score in the academic performance domain in comparison to the other group ( $p < 0.001$ ) (Table 5). In addition, students who received the intervention program showed significant lower distress according to the GHQ compared to their counterparts in the control group after the intervention ( $p < 0.001$ ) (Table 6). On comparing the scores of MBI-SS & GHQ-12 in each of the intervention and control group before and after implementing the

program. A significant improvement in the emotional exhaustion, academic performance domain and GHQ scores among the intervention group (Table 7) was noted. However, there was a significant reduction in the academic performance domain among the control one ( $p < 0.001$ ) 1 month later from the original ones together with a significant higher GHQ score as well ( $p < 0.01$ ) (Table 8). Despite not having statistically significant changes in the scores of the emotional and cynicism domains in the control group, there was clinically significant increase in their scores after 1 month of the original ones.

### Discussion

This study was conducted to reveal the prevalence of burnout among medical



students at Suez Canal University in Egypt, and to examine the effect of a brief interv-

ention program in decreasing burnout among them.

Variables	Total (n=97)	Groups		test value	P value
		Interventional (n=47)	Control (n=50)		
<b>Age (years), mean ± SD</b>	19.66 ± 1.26	19.57 ± 0.72	19.74 ± 1.6	941.5	0.07 <sup>a</sup>
<b>Gender, n (%)</b>					
Male	39 (40.2)	18 (38.3)	21 (42)	0.14	0.71 <sup>b</sup>
Female	58 (59.8)	29 (61.7)	29 (58)		
<b>Marital Status</b>					
Single	95 (97.9)	46 (97.9)	49 (98)	0.002	0.9 <sup>c</sup>
Engaged	2 (2.1)	1 (2.1)	1 (2)		
<b>Marital status of the parents</b>					
Married	93 (95.9)	46 (97.9)	47 (94)	1.27	0.98 <sup>c</sup>
Separated	1 (1)	0	1 (2)		
Divorced	3 (3.1)	1 (2.1)	2 (4)		
<b>Academic Grades</b>					
Excellent	60 (61.9)	30 (63.8)	30 (60)	0.49	0.97 <sup>c</sup>
Very good	19 (19.6)	9 (19.1)	10 (20)		
Good	16 (16.5)	7 (14.9)	9 (18)		
Fair	2 (2.1)	1 (2.1)	1 (2)		
<b>Attending academic course</b>					
Regular	68 (70.1)	32 (68.1)	36 (72)	0.18	0.67 <sup>b</sup>
Not regular	29 (29.9)	15 (31.9)	14 (28)		
<b>Smoking history</b>					
Present	4 (4.1)	2 (4.3)	2 (4)	0.004	0.98 <sup>c</sup>
Absent	93 (95.9)	45 (95.7)	48 (96)		
<b>History of drugs</b>					
Present	4 (4.1)	1 (2.1)	3 (6)	0.92	0.62 <sup>c</sup>
Absent	93 (95.9)	46 (97.9)	47 (94)		
<b>Practicing exercise</b>					
Present	30 (30.9)	15 (31.9)	15 (30)	0.04	0.84 <sup>b</sup>
Absent	67 (69.1)	32 (68.1)	35 (70)		
<b>History of chronic disease</b>					
Present	11 (11.3)	5 (10.6)	6 (12)	0.05	0.83 <sup>b</sup>
Absent	86 (88.7)	42 (89.4)	44 (88)		
<b>Family history of c disease</b>					
Present	57 (58.8)	31 (66)	26 (52)	1.95	0.16 <sup>b</sup>
Absent	40 (41.2)	16 (34)	24 (48)		
<b>Financial problems</b>					
Present	7 (7.2)	5 (10.6)	2 (4)	1.59	0.26 <sup>c</sup>
Absent	90 (92.8)	42 (89.4)	48 (96)		
<b>Social problems</b>					
Present	14 (14.4)	9 (19.1)	5 (10)	1.64	0.2 <sup>b</sup>
Absent	83 (85.6)	38 (80.9)	45 (90)		
<b>Hours of study/day, mean ±SD</b>	3.33 ± 1.21	3.18 ± 1.28	3.46 ± 1.28	1038	0.31 <sup>a</sup>

a= Mann-Whitney U test, b= chi-square test, c= fisher exact test, Statistical significance at p < 0.05



Our study - up to our knowledge- is the first in Egypt to measure the effect of such intervention program on burnout among medical students. The prevalence of stress among the students was 51%, which is in congruent to that mentioned in previous studies held in the United States

and Malaysia, where the prevalence of stress among their students was 51% & 57% respectively<sup>(17,18)</sup>. However, this result is much higher than that reported in India as the prevalence of stress was about 28%<sup>(19)</sup>, and higher than that found by Sarikaya et al in Turkey (25.6%)<sup>(20)</sup>.

Variables	Total mean ± SD	Group		test value	P value
		Intervention mean ± SD	Control mean ± SD		
<b>Pre-intervention</b>					
Emotional domain	21.10 ± 4.74	20.4 ± 4.68	21.76 ± 4.75	952	0.107 <sup>a</sup>
Cynicism	15.63 ± 4.82	15.3 ± 4.96	15.94 ± 4.72	1089	0.533 <sup>a</sup>
Academic domain	20.20 ± 6.89	18.98 ± 6.18	21.34 ± 7.38	929	0.075 <sup>a</sup>
<b>Post-intervention</b>					
Emotional domain	19.56 ± 4.47	18.72 ± 4.5	20.34 ± 4.35	857	<b>0.021<sup>a</sup></b>
Cynicism	15.77 ± 4.26	14.98 ± 4.15	16.52 ± 4.27	957	0.114 <sup>a</sup>
Academic domain	22.46 ± 6.79	25.51 ± 5.06	19.60 ± 7.00	582	<b>&lt;0.001<sup>a</sup></b>

a= Mann-Whitney U test. Statistical significance at  $p < 0.05$

This variation may be related to the smaller sample size in the Indian study (115 students) and the different scoring method for stress in the Turkish one. Burnout prevalence was also relatively high as it was found to be 43%, where burnout was associated with significant higher stress levels, which is represented in the higher scores of the GHQ ( $P < 0.001$ ). This level of burnout is -again- near to that found in US as it was mentioned to be about 49%<sup>(21)</sup>, and in contrast to that found in Spain where the prevalence was only 14.8%<sup>(22)</sup>. This difference may be related to using only 2 domains (exhaustion & cynicism) in the spinach study to determine burnout, while in our study we used the 3 domains. High levels of burn out was recorded in our study for emotional exhaustion and cynicism domains in more than half of the students (57.5 % and 62.2% respectively) and for 27.5% of them in the academic performance one. These results are close to

that found in the study conducted by Chang et al, where the prevalence of emotional exhaustion was 51.7%, and that for cynicism was 44%, however, higher result was found in the academic performance domain, where it was 52%<sup>(23)</sup>. In Dyrbye et al study the level of emotional exhaustion was not as high as these studies, where it was about 40%, which is applied also to the results of cynicism and academic performance domains (31.8% & 30.6% respectively)<sup>(21)</sup>. This variation among different studies may be related to the differences in the definition of burnout itself in these studies, where stricter definition may lead to higher prevalence. It was found that burn out among students is significantly associated with less exercise practice ( $p < 0.001$ ), a result that is in agreement with that reported by others where physical activity was associated with less stress and burnout, a matter that was also mentioned in the literature<sup>(24, 25)</sup>.

Table 6 :Comparison of General Health Questionnaire (GHQ) score in both groups (n=97)					
Variables	Total mean $\pm$ SD	Group		test value	P value
		Intervention mean $\pm$ SD	Control mean $\pm$ SD		
<b>Pre-intervention</b>					
General Health Questionnaire score	4.33 $\pm$ 2.32	4.74 $\pm$ 2.16	3.94 $\pm$ 2.42	915	0.057 <sup>a</sup>
<b>Post-intervention</b>					
General Health Questionnaire score	3.9 $\pm$ 2.12	3 $\pm$ 1.66	4.74 $\pm$ 2.17	601	<0.001 <sup>a</sup>

a= Mann-Whitney U test. Statistical significance at  $p < 0.05$

Table 7: Assessment of burn out domains and GHQ in the study group before and after intervention (n=47)				
Variables	Pre-intervention mean $\pm$ SD	Post-intervention mean $\pm$ SD	test value	P value
<b>Burn out domains</b>				
Emotional domain	20.4 $\pm$ 4.68	18.72 $\pm$ 4.5	-1.97	<b>0.042<sup>a</sup></b>
Cynicism	15.3 $\pm$ 4.96	14.98 $\pm$ 4.15	-0.79	0.379 <sup>a</sup>
Academic domain	18.98 $\pm$ 6.18	25.51 $\pm$ 5.06	-5.42	<b>&lt;0.001<sup>a</sup></b>
<b>General Health Questionnaire Score</b>	4.74 $\pm$ 2.16	3 $\pm$ 1.66	-5.21	<b>&lt;0.001<sup>a</sup></b>

a= Wilcoxon Signed Ranks Test. Statistical significance at  $p < 0.05$

After implementing the intervention program, students in the interventional group had a significant lower score in the emotional exhaustion domain of the burn out ( $p=0.014$ ) and a significant higher score in the academic performance one ( $p<0.001$ ), in comparison to the control group. In addition, they had a significant improvement in the GHQ scores compared to their counterparts in the control group ( $p<0.001$ ). These results are in congruent with that found in other studies as that of Sonmez et al and Bresó et al, where there was significant decline in the level of exhaustion and personal performance domains in the intervention group compared to the control one (26, 27). Likewise, study conducted by Brake et al revealed a significant change in the exhaustion and personal achievement domains levels among the intervention group after 1 month of the program compared to the control

group<sup>(28)</sup>. Gorter et al study on dentists detected also significant improvement in the same mentioned domains; however there was also statistical significant decline in the cynicism scores amongst the intervention group compared to the controlled one (29). Similarly; Martins et al found a significant decrease in the cynicism domain only in the intervened group of pediatric residents in Argentina, a result that is totally different from our one (30). This may be due to the differences in the studied group in the two studies compared to ours (physicians vs. undergraduate students) whereas mentioned in the literature- dealing with more patients affects deeply the physicians' attitude towards them by treating them as objects (31), leading to developing of depersonalization or cynicism domain in burnout, suggesting that it could be the main domain to be affected by the program.

Table 8: Assessment of burn out domains and GHQ in the control group before and after intervention (n=50)				
Variables	Pre-intervention mean $\pm$ SD	Post-intervention mean $\pm$ SD	test value	P value
<b>Burn out domains</b>				
Emotional domain	21.76 $\pm$ 4.75	20.34 $\pm$ 4.35	-1.44	0.15 <sup>a</sup>
Cynicism	15.94 $\pm$ 4.72	16.52 $\pm$ 4.27	-1.38	0.196 <sup>a</sup>
Academic domain	21.34 $\pm$ 7.38	19.60 $\pm$ 7.00	-3.44	<b>0.001<sup>a</sup></b>
<b>General Health Questionnaire score</b>	3.94 $\pm$ 2.42	4.74 $\pm$ 2.17	-3.39	<b>0.001<sup>a</sup></b>

a= Wilcoxon Signed Ranks Test. Statistical significance at  $p < 0.05$

### Limitations of the Study

As the participants knew that the study measures the effect of the intervention program on burnout levels before and after administering it, they may give positive results in the post questionnaire because of their expectations for improvement. To overcome this, the name of the questionnaires and the method of scoring were hidden from the students. Also, this study didn't measure the long-term effect of the program and whether the change will last for longer time or not.

### Conclusions

High levels of stress and burnout are prevalent among medical students with significant association between them. Practicing exercise could significantly has a great effect in decreasing this phenomenon. Implementing brief intervention programs to help students to cope with their stress and to manage their stressors could lead to significant improvements and decreasing burnout prevalence among them, however it is recommended to carry out further research to measure the long-term effect of such programs.

*List of abbreviations:* Emotional Exhaustion (EE), General Health Questionnaire-12 (GHQ-12), Maslach Burnout Inventory-Student Survey (MBI-SS)

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*Authors' contribution:* All authors contributed to the study conception and design. Material preparation and data collection were performed by SME. All authors read and approved the final manuscript. The authors have delegated all authority to publish the article to the corresponding author

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