Stress and Burnout among Medical Students

Ghada O. Wassif ¥, Dina A. Gamal-Eldin, Dina N.K. Boulos

Department of Community, Environmental and Occupational Medicine, Ain Shams University, Cairo, Egypt

Abstract

Background: Numerous studies have shown a high incidence of burnout in health care professionals as well as individuals whose activities are psychologically similar to the work of students.

Objective(s): The study aimed to estimate the frequency of stress and burnout among medical students and to investigate the relationship between stress, burnout level, medical students' characteristics and some health related behaviors.

Methods: A Cross sectional study was carried out at Faculty of Medicine, Ain Shams University, Cairo, Egypt among 390 medical students. Data were collected using two validated instruments "Cohen's Perceived Stress Scale" & "Maslach Burnout Inventory Scale"

Results: Nearly two thirds of the medical students 66.1% had high stress levels; the most prominent burn out subscale was depersonalization 75.6%. The main 3 reasons of stress among medical students were fear of hurting patients, students' perception that their clinical practice is not enough, limited time for training. There was a highly statistically significant relationship between high stress levels, high burnout subscales, using hypnotics and smoking.

Conclusion: Medical students are exposed to a great deal of stress & burnout symptoms that mainly result from their worry about their future career and late exposure to clinical training. The present study would recommend integration of clinical sciences with basic sciences in addition to social skills in the medical students' curricula.

Keywords: Burnout syndrome, Perceived stress, Medical students, Cairo, Egypt.

INTRODUCTION

Medical education is very stressful period as medical students are being transformed from young school students into physicians who should acquire large amount of medical information and diverse skills.[1] Systematic review of 40 studies concluded that the overall psychological distress and prevalence rates of depression and anxiety in medical students are higher than nonmedical students or age-matched peers from the general population.[2]

In Egypt, Salwa, 2018 carried out a cross sectional study among medical students of Tanta university and concluded that burnout and/or its subscales were quite prevalent among medical students of Tanta University (79.9%), especially at the clinical level of study. Disappointment with coursework and difficulties in achieving academic goals lead some students to take medication and thinking of quitting the program to relieve their stress [3]. In the Arab world, studies on medical students have reported similar high levels of perceived psychological stress and depression related to internal and external variables, which accord with results reported in the international literature [4],[5]. The huge amount of

stress in medical education may lead to many adverse effects such as diminished attention and concentration, increased incidence of errors, negligence, absenteeism, self-medication, and cheating during examinations.[6] Medical education has been reported as one of the most stressful curricula throughout the world as it caused many negative consequences on the mental and physical health of medical students. Two studies carried out by Gupta et al., 2015 and Abraham et al., 2009 to explore the factors contributing to stress among undergraduate medical students and found that fear of examinations, lack of leisure time and high parental expectations are important reasons of medical students stressful life.[7,8]

This study aimed to estimate the frequency of stress and burnout among medical students and to investigate the relationship between stress, burnout level, medical students' characteristics and some health related behaviors.

METHODS

Study type & Study population

A cross-sectional study was carried out at the faculty of medicine, Ain Shams University, Cairo, Egypt. A

convenient sample of medical students was selected from Grade 1 to Grade 6.

Sample size

Sample size was calculated using Open Epi, Version 3, open source calculator; taking into consideration that total number of students in the previous year 2017-2018 was equal to about 6315 medical students. The recommended sample size was at least 319 medical students with confidence level of 95.0%; and based on a study carried out by Ragaa et al., 2013 [9] who mentioned that burnout was diagnosed in 76.8% of medical students. The sample size was increased to include 390 students which would increase the confidence level to more than 97.0% to give the chance to greatly represent medical students in different grades of the faculty of medicine as burn out and perceived stress is a pressing need to be explored in a meticulous way as they have been associated with many physical & mental morbidities among medical students.

Study tool

Data were collected using an anonymous self-administered questionnaire, which consisted of two validated instruments "Cohen's Perceived Stress Scale" and "Maslach Burnout Inventory Scale"; students' sociodemographic data and causes of stress were also included.

The sources of stress included in the questionnaire were obtained by a thorough review of literature and discussions with medical students [9]. Stress was measured by a previously validated tool "Cohen's Perceived Stress Scale" PSS-10 which is a 5 point Likert scale instrument ranging from never (0) to almost always [4]. The instrument consisted of 10 items; where items no. 4, 5, 7 and 8 are positively worded items. Positively worded items were reverse scored, and the items were summed up where higher scores mean high levels of perceived stress. Scores around 13 are considered average. High stress levels are considered if the student scored 20 or higher. Reliability of the PSS-10 questionnaire was tested using Cronbach's coefficient and was found to be 0.85 [10].

The level of burnout was measured by another validated instrument "Maslach Burnout Inventory Scale". Burnout scale consists of three Sections.

Section I. Depressive anxiety subscale which is manifested by chronic fatigue, trouble sleeping, physical problems. The key differentiating clue between Depressive anxiety subscale related to burnout syndrome and depression as a psychiatric illness is that the depressive anxiety symptoms in burnout syndrome disappear outside work.

Scoring system: $\leq$ 17: Low burnout level; 18-29: Moderate burnout level and $\geq$ 30: High burnout level.

Section II. Depersonalization subscale or loss of empathy: This subscale is characterized by loss of physicians' empathy toward his patients and/or his colleagues. The person began to be socially isolated and to have negative attitudes toward his patients or colleagues.

Scoring system: $\leq$ 5: Low burnout level; 6-11: Moderate burnout level and $\geq$ 12: High burnout level.

Section III. Personal achievement subscale: The person here feels that he is unable to move any step forward to achieve his planned objectives.

Scoring system: $\leq$ 33: High burnout level, 34-39: Moderate burnout level and $\geq$ 40: Low-level burnout. A high score in the depressive anxiety and depersonalization sections and a low score in the personal achievement section indicates burnout. Reliability of the "Maslach Burnout Inventory Scale" questionnaire was measured by Cronbach's alpha coefficient and was found to be 0.900.[11]

Statistical analysis

The collected data were revised, coded, introduced to a PC and finally analyzed using (IBM SPSS Version 20) statistical package for social sciences. In categorical data, chi-squared test was used for comparison between groups. $p \leq 0.05$ was considered statistically significant.

Ethical considerations

The study was approved by the institutional review board and the ethics committee. Administrative approvals to carry out the study was obtained from dean and vice dean of student affairs; ethical committee board approval was obtained. Verbal consent was obtained from medical students, confidentiality of data was assured by administering anonymous questionnaire.

RESULTS

Concerning the sociodemographic characteristics of the studied students; the present study showed that more than half of the participating students were males 54.6%, while 45.4% were females; 53.3% were in the preclinical academic years, while 46.7% were in the clinical academic year; the majority were urban residents 77.9%. Concerning health related behaviors among medical students; 7.9% were current smokers, 5.9% & 5.1% admitted current use of hypnotics & Tramadol respectively & 0.8% currently drink alcohol (Table 1).

Regarding the frequency of stress and burnout subscales among medical students; the present study revealed that about two thirds of the medical students 66.2% had high stress levels, more than one quarter 28.5% had high depressive anxiety levels, about three fourth 75.64% had high levels of depersonalization, nearly two thirds 65.4% had high levels of lack of personal achievement (Figure 1). Regarding relationship between students socio-demographic characteristics, health related behaviors with students' stress levels and burnout subscales; this study clarified that there was a statistically significant relationship between high stress levels and using hypnotics among medical students; there was a statistically significant relationship between high depressive anxiety levels and smoking, using hypnotics and Tramadol; there was also a statistically significant relationship between

high depersonalization levels and academic year and using hypnotics; Moreover; there was a statistically significant relationship between high levels of lack of personal achievement levels and smoking (Tables 2-5). Concerning the main reasons of stress among medical students, the current study revealed that fear of hurting patients, students' perception that their clinical practice is not enough, limited time for training, worry about future career and high parental expectations were the most stressful

situations students face during their undergraduate study (Figure 2). Multiple linear regression analysis revealed that smoking status, hypnotics and Tramadol are independent predictors of depressive anxiety subscale. Also, that smoking status and Tramadol are independent predictors of depersonalization subscale; moreover; smoking status is an independent predictor of low personal achievement subscale of burnout syndrome (Tables 6-8).

Table 1: Characteristics of the studied medical students

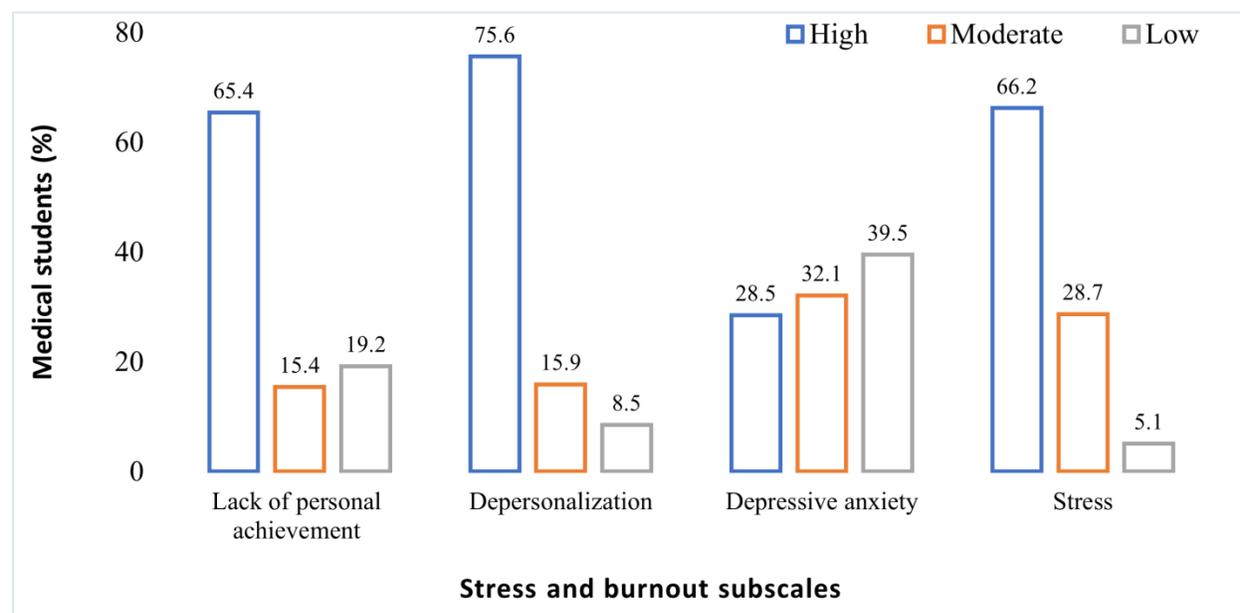| Variables		Medical students = 390	
		n	%
Sex	Male	213	54.6
	Female	177	45.4
Academic year	Preclinical (1-3)	208	53.3
	Clinical (4-6)	182	46.7
Residence	Rural	86	22.1
	Urban	304	77.9
Smoking status	Never smoker	334	85.6
	Current smoker	31	7.9
	Former smoker	25	6.4
Current use of hypnotics	No	367	94.1
	Yes	23	5.9
Current use of Tramadol	No	370	94.9
	Yes	20	5.1
Currently drinking alcohol	No	387	99.2
	Yes	3	0.8

Figure 1: Frequency of stress and burnout subscales among medical students

Table 2: Relationship between stress level, characteristics and health related behaviors of studied medical student

Variables		Stress level among medical Students (n=390)						Chi square	*p*-value
		No Stress		Average Stress		High Stress			
		n	%	n	%	n	%		
Sex	Male	12	5.6	67	31.5	134	62.9	2.205	0.332
	Female	8	4.5	45	25.4	124	70.1		
Academic year	Preclinical	12	5.8	63	30.3	133	63.9	2.162	0.997
	Clinical	8	4.4	49	26.9	125	68.7	FE (#)	
Residence	Rural	3	3.5	25	29.1	58	67.4	0.611	0.737
	Urban	17	5.6	87	28.6	200	65.8		
Smoking status	Never smoker	19	5.7	98	29.3	217	65.0	5.611	0.190
	Current smoker	0	0.0	11	35.5	20	64.5	FE (#)	
	Former smoker	1	4.0	3	12.0	21	84.0		
Current use of Hypnotics	No	20	5.4	111	30.2	236	64.3	9.523	0.009**
	Yes	0	0.0	1	4.3	22	95.7		
Current use of Tramadol	No	20	5.4	108	29.2	242	65.4	2.250	0.325
	Yes	0	0.0	4	20.0	16	80.0		
Currently drinking Alcohol	No	20	5.2	110	28.4	257	66.4	2.396	0.333
	Yes	0	0.0	2	66.7	1	33.3	FE (#)	

(#) Fisher Exact test was used as (20.0%) of the cells or more have expected count less than 5

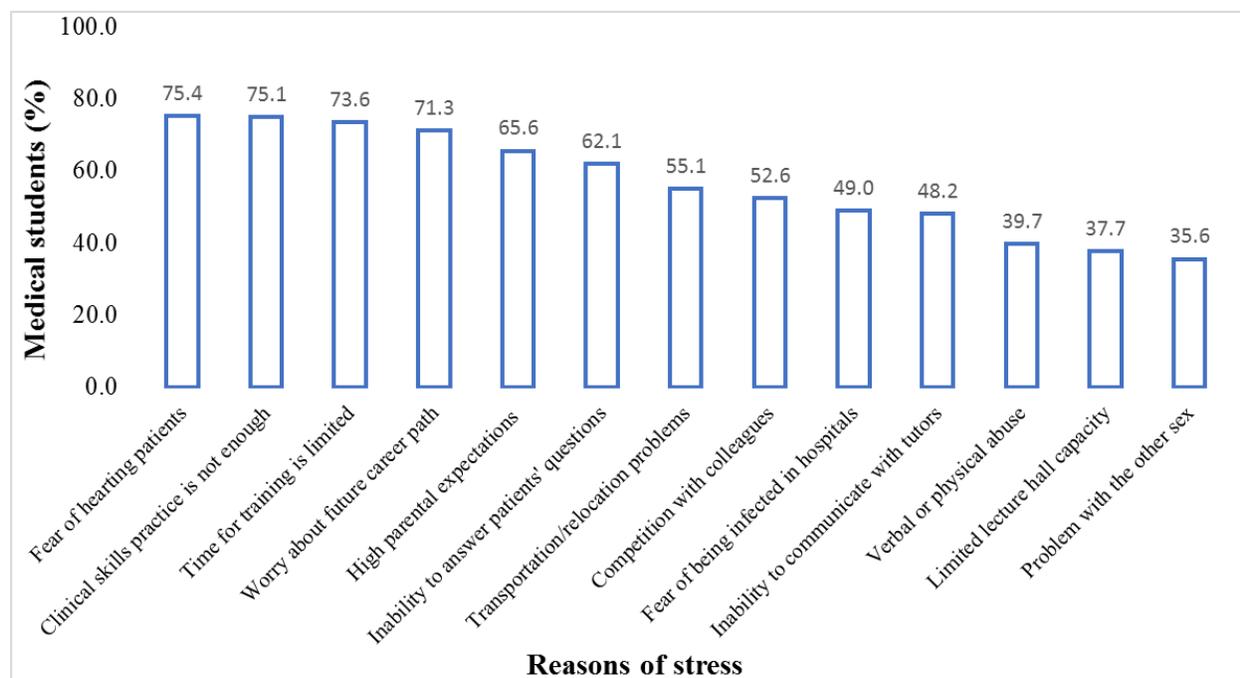(**) Highly statistically significant at *p*< 0.01

Figure 2: Reasons of stress among medical students

Table 3: Relationship between depressive anxiety level, characteristics and health related behaviors of studied medical students

Variables		Depressive anxiety level among medical students (n=390)						Chi square	p-value
		Low level Burnout		Moderate level Burnout		High level Burnout			
		n	%	n	%	n	%		
Sex	Male	87	40.8	67	31.5	59	27.7	0.367	0.832
	Female	67	37.9	58	32.8	52	29.4		
Academic year	Preclinical	91	43.8	57	27.4	60	28.8	12.990	0.224
	Clinical	63	34.6	68	37.4	51	28.0		
Residence	Rural	38	44.2	26	30.2	22	25.6	1.052	0.591
	Urban	116	38.2	99	32.6	89	29.3		
Smoking status	Never smoker	141	42.2	111	33.2	82	24.6	23.317	
	Current smoker	6	19.4	12	38.7	13	41.9	FET (#)	<0.001**
	Former smoker	7	28.0	2	8.0	16	64.0		
Current use of Hypnotics	No	151	41.1	117	31.9	99	27.0	9.214	0.010*
	Yes	3	13.0	8	34.8	12	52.2		
Current use of Tramadol	No	154	41.6	118	31.9	98	26.5	18.270	<0.001**
	Yes	0	0.0	7	35.0	13	65.0		
Currently drinking Alcohol	No	153	39.5	124	32.0	110	28.4	0.514	1.000
	Yes	1	33.3	1	33.3	1	33.3	FE (#)	

(#) Fisher Exact test was used as (20.0%) of the cells or more have expected count less than 5

(*) Statistically significant at *p*< 0.0   (**) Highly significant at *p*< 0.01

Table 4: Relationship between depersonalization level, characteristics and health related behaviors of studied medical students

Variables		Depersonalization level among medical students (n=390)						Chi square	p-value
		Low level Burnout		Moderate level Burnout		High level Burnout			
		n	%	n	%	n	%		
Sex	Male	22	10.3	38	17.8	153	71.8	3.949	0.139
	Female	11	6.2	24	13.6	142	80.2		
Academic year	Preclinical	20	9.6	45	21.6	143	68.8	19.260	0.037*
	Clinical	13	7.1	17	9.3	152	83.5		
Residence	Rural	10	11.6	8	9.3	68	79.1	4.497	0.106
	Urban	23	7.6	54	17.8	227	74.7		
Smoking status	Never smoker	29	8.7	57	17.1	248	74.3	7.679	0.084
	Current smoker	0	0.0	4	12.9	27	87.1	FE (#)	
	Former smoker	4	16.0	1	4.0	20	80.0		
Current use of Hypnotics	No	32	8.7	62	16.9	273	74.4	5.997	0.039*
	Yes	1	4.3	0	0.0	22	95.7	FE (#)	
Current use of Tramadol	No	33	8.9	61	16.5	276	74.6	3.519	0.145
	Yes	0	0.0	1	5.0	19	95.0	FE (#)	
Currently drinking Alcohol	No	33	8.5	61	15.8	293	75.7	1.319	0.568
	Yes	0	0.0	1	33.3	2	66.7	FE (#)	

(#) Fisher Exact test was used as (20.0%) of the cells or more have expected count less than 5   (*) Statistically significant at *p*<0.05

Table 5: Relationship between personal achievement level, characteristics and health related behaviors of the studied medical students

Variables		Personal achievement level among medical students (n=390)						Chi square	*p*-value
		Low level Burnout		Moderate level Burnout		High level Burnout			
		n	%	n	%	n	%		
Sex	Male	35	16.4	29	13.6	149	70.0	4.365	0.113
	Female	40	22.6	31	17.5	106	59.9		
Academic Year	Preclinical	40	19.2	33	15.9	135	64.9	0.083	0.959
	Clinical	35	19.2	27	14.8	120	65.9		
Residence	Rural	20	23.3	15	17.4	51	59.3	1.857	0.395
	Urban	55	18.1	45	14.8	204	67.1		
Smoking status	Never smoker	55	16.5	52	15.6	227	68.0	19.956 FE (#)	0.000**
	Current smoker	6	19.4	7	22.6	18	58.1		
	Former smoker	14	56.0	1	4.0	10	40.0		
Current use of Hypnotics	No	69	18.8	56	15.3	242	65.9	1.244 FE (#)	0.535
	Yes	6	26.1	4	17.4	13	56.5		
Current use of Tramadol	No	72	19.5	56	15.1	242	65.4	0.585 FE (#)	0.792
	Yes	3	15.0	4	20.0	13	65.0		
Currently drinking Alcohol	No	75	19.4	60	15.5	252	65.1	0.645 FE (#)	1.000
	Yes	0	0.0	0	0.0	3	100.0		

(#) Fisher Exact test was used as (20.0%) of the cells or more have expected count less than 5

(**) Highly statistically significant at *p*<0.01

Table 6: Multiple linear regression analysis displaying independent predictors of depressive anxiety subscale of burnout syndrome among medical students

Model		Medical students (n= 390)				
		Coefficients ᵃ				
		Unstandardized Coefficients		Standardized Coefficients	*t*	Sig. *p*-value
		B	Std. Error	Beta		
1	(Constant)	17.765	3.107		5.717	<0.001
	Sex	1.012	1.121	.044	.903	.367
	Academic year	.015	.341	.002	.043	.966
	Residence	.522	1.337	.019	.391	.696
	Smoking status	3.330	.770	.209	4.322	<0.001**
	Hypnotics	6.134	2.435	.125	2.520	.012*
	Tramadol	10.853	2.599	.207	4.176	<0.001**
	Alcohol	-3.543	6.380	-.027	-.555	.579

a. Dependent Variable: Depressive Anxiety subscale of Burnout syndrome
(*) Statistically significant at *p*< 0.05
(**) Highly statistically significant at *p*< 0.01

Table 7: Multiple linear regression analysis displaying independent predictors of depersonalization subscale of burnout syndrome

Model		Medical students (n= 390)				
		Coefficients [a]				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		p-value
1	(Constant)	15.892	2.820		5.635	.000
	Sex	.312	1.017	.015	.306	.760
	Academic year	.400	.310	.061	1.290	.198
	Residence	.009	1.213	.000	.007	.994
	Smoking status	4.141	.699	.282	5.922	.000**
	Hypnotics	4.020	2.210	.089	1.819	.070
	Tramadol	9.284	2.359	.193	3.935	.000**
	Alcohol	-5.295	5.791	-.044	-.914	.361

a. Dependent Variable: Depersonalization subscale of Burnout syndrome

(**) Highly statistically significant at $p< 0.01$

Table 8: Multiple linear regression analysis displaying independent predictors of low personal achievement subscale of burnout syndrome

Model		Medical students (n= 390) Coefficients [a]				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		p-value
1	(Constant)	27.984	3.211		8.715	.000
	Sex	1.334	1.158	.058	1.152	.250
	Academic year	-.422	.353	-.061	-1.196	.232
	Residence	-.835	1.381	-.030	-.604	.546
	Smoking status	2.018	.796	.129	2.534	.012*
	Hypnotics	4.032	2.516	.084	1.603	.110
	Tramadol	-.432	2.686	-.008	-.161	.872
	Alcohol	-8.647	6.593	-.067	-1.311	.190

a. Dependent Variable: low personal achievement subscale of Burnout syndrome

(*) Statistically significant at $p<0.05$

DISCUSSION

Medical students' mental health has been a major concern in many countries as physicians' stress and anxiety could lead to patients' adverse events which should not be allowed by any means in the medical profession [12-14]. In the present study the frequency of smoking among studied medical students represented 7.9% of the total sample; this percentage is less than the finding of a survey of tobacco use among Egyptian university students reporting an overall percentage of current tobacco users among university students as 16.5% and also less than Mira et al., (2018) who reported a higher prevalence of smokers 12.0% among medical students in Tanta university.[15,16]

These observed differences in frequency of smoking among medical students might be affected by the distribution of age and sex among different samples included in different studies (smoking as a practice increases with age and male sex), In addition to that we were only comparing the overall prevalence of smoking and we didn't precisely compare other factors such as no. of cigarettes, number of packs per day nor the duration of smoking which might also explain this discrepancy between the above two studies.

Regarding the frequency of stress and burnout subscales among medical students; the present study revealed that about two thirds of the medical students had high stress levels, where stress levels were higher in the

clinical years as compared to the preclinical years. This is explained by the fact of students' fear of facing the future as they begin to think and portray an image about their future profession and medical career. This finding is supported with a review article by Fares et al., (2016)[17] who performed a detailed scholarly research in studies concerned with stress and burnout levels in medical students between 1988-2015; and the study revealed that stress levels varied largely among preclinical medical students in different studies and ranged from 20.9% to more than 90% and as a sequelae stress continues to increase in intensity in the clinical years as a result of overwhelming academic pressures to learn huge amount of information within a limited time period and a fear of their future carrier as doctors. This was further supported by a study carried out by El-Masry et al., (2013)[18] who carried out his research among 6th year medical students and found that final year students have fear of causing harm to patients due to inadequate clinical training and lack of skills with subsequent fear of litigation as well. These findings come in accordance with our findings when we tried fetching the causes of stress among medical students and found that the most common causes for stress among medical students' were fear of harming patients, the clinical skills practice was not enough and that time for training was limited; worry about their future career and high parental expectations representing.

The present study also revealed that more than one quarter of participating medical students had high depressive anxiety levels, about three fourth had high levels of depersonalization, and nearly two thirds had high levels of lack of personal achievement. The percentage was almost similar for preclinical and clinical students regarding depressive anxiety levels and lack of personal achievements levels. However, the depersonalization component was significantly higher in clinical students as compared to preclinical students. These findings come in accordance with a study carried out by Pöhlmann et al., (2005)[19] who studied a total of 161 dental medicine students in the 4th and 5th year at the universities of Bern, Freiburg and Dresden and came to the conclusion that depersonalization component was especially the most prominent subscale among all studied burnout subscales, with 28% of students surveyed showing increased values. Depersonalization is characterized by lack of empathy and loss of motivation with a sense of isolation.[20, 21] Depersonalization can result in negative attitudes toward patients; where the affected doctors perceive their patients not as a person but as a true object.[10] Depersonalization, anxiety and burnout could be the result of chronic stress that could occur due to intensive contact with patients and all patient related aspects.[22, 23] Medical students who lack social competence skills might be more susceptible to depersonalization at the professional context and negative social relationships with peers on the personal level as they may experience difficulties in dealing with patients adequately so they start to detach themselves from their personal and professional contexts.[24] The present study clarified that there was a statistically significant relationship between high stress levels, high depressive anxiety levels, high depersonalization and using hypnotics; Moreover; there was a statistically significant relationship between high depressive anxiety levels and low personal achievement and smoking among medical students; this finding was in accordance with a study carried out by Leta et al., (2015)[25] who reported that health risky behaviors like smoking, substance use and alcohol drinking were commonly practiced among students with high stress levels; the study also revealed that students who reported substance use were 3.03 times at risk to have stress than non-substance users; Cigarette smoker students were 4.55 at risk to have stress than nonsmoker; Alcohol drinkers were 1.93 at risk to have stress than nondrinkers. This is also consistent with a study carried out by Ahmed et al., (2014)[26] who found that Sedative drug use was found to be more common among Saudi medical students with a lower GPA. Students with a poorer academic record may have had problems organizing their time and may therefore have been more likely to use a quick method of inducing sleep at the desired time. The first- and second-year courses are preclinical and may consist of a schedule similar to courses in high school. Starting from the 3rd year, students have a clinical component in their courses, which increases their level of stress and may have caused a higher prevalence of sedative drug use.

Study limitations

The present study involves students from one University "Ain Shams University" only, it is recommended to carry out this study on a wider scale in other universities in order to get a better insight of the problem of burnout and stress among medical students; in addition to that revisiting this topic is recommended after implementation of the new integrated system or what is known as "5+2 system" to compare the level of burnout and stress among medical students and to discover new sources of stress and burnout if any.

CONCLUSION AND RECOMMENDATIONS

The present study concluded that students in the clinical period had higher stress and burnout levels than preclinical periods and this was probably attributed to students' fear of facing their future career and fear of harming patients due to lack of proper clinical training which start in the late clinical years only. These high levels of stress and burn out were significantly related to risky behaviors as using hypnotics and smoking. Depersonalization was the most prominent among all burnout subscales which might be related to students' exposure to chronic stress and lack of social and communication skills.

The study recommends that students had to be taught stress coping mechanisms in order to alleviate stress symptoms and prevent its progression to burnout syndrome; More attention should be directed to clinical

training and dealing with patients starting from the first year in the medical colleague to remove students' fears from hurting patients and increasing students' confidence in their clinical skills.

Social competence training might be helpful especially for students with high depersonalization levels to enhance their communication skills.

Conflict of Interest
The authors declare no conflict of interest.

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