Stress and Coping Strategies among Medical Students in Zagazig University - A Prospective Cohort Study

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Abstract

Background: Medical education is one of the most stressful curricula, in which the medical students face various types of stressors. Coping withstressors needs motivation, guidance, and individual and social support.**Objectives:**to estimate frequency and predictors of perceived stress, to determine main stressors and stress coping interventions adopted by medical students in faculty of Medicine, Zagazig University, during their academic and clinical phases.**Method:** A prospective cohort study was conducted on163medical studentswho completed the study till its end at faculty of medicine, Zagazig University during period from the beginning of March 2017 to the end of August 2019,using thePerceived Stress Scale, medical student's stressor questionnaire and brief cope scale.**Results:** About 69% and 68% of students had moderate to high perceived stress during academic and clinical phases respectively (p>0.5).There was significant relation between perceived stress and social class in both phases. Fair rank, low and middle social class were significant independent predictors for higher stress level in clinical phase (AOR=10.243, 97.503 and 185.776). Academic stressors were higher in both phases. Approach coping significantly increased in clinical phase while Avoidant coping did non-significantly change.Emotional, informational support, reframing and acceptance significantly increased. Self-distraction, self-blame and denial non-significantly decreased.**Conclusion:** Medical education is a stressful event that threatens physical and mental well-being. Academic and social stressors are the most frequent types during both academic and clinical phases. Approach coping was higher within academic phase and significantly increased in clinical phase with regression of avoidant coping.

Keywords: *Stress, Coping, phases, medicine*

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Introduction

Stress can generally be defined as the body's non-specific response to the demands made of it, and can also be defined as an unpleasant emotional experience that is accompanied by predictable biochemical, physiological and behavioral changes.[1-2] Excessive stress may lead to a lot of health problems like anxiety, depression, drug abuse and other complications.[3] Medical education is one of the most stressful curricula, in which the medical students face various types of stressors. The sources of theses stressors can be academic, economical, personal, social, parental pressure, drive and desire etc. [(3)]. Other stressors that affect medical students rather than academics are time pressure, university life and separation from family and friends.[4]

High levels of stress have been reported among those population in various studies around the world.[5-7]Researchesin Egypt,

Saudi Arabia and the United Arab Emirates declaredmedical students had higher stress levels.[8-11]A previous study at Fayoum University in Egypt reported that 60 per cent of them suffered from stress.[12]

Coping skills can be described as the rapidly changing cognitive and behavioral efforts employed by the individual to handle or reduce stress.[13]Coping with such stressors needs motivation, guidance, and individual and social support.[3]Coping skills play important role in the professional life of future's doctor. For example, coping strategies not only helps to appraise distressing events in positive way[14] and improve dealing with depersonalization[15], it also helps in developing the characteristic which improve doctor-patient relationship[16].Failure to cope or deal with these stresses among medical students may be due to maladaptive coping strategies which may lead to Psychiatric morbidity.[17]

The aim of our work was to estimate frequency and predictors of perceived stress, to determine main stressors and stress coping interventionsadopted by medical students in faculty of Medicine, Zagazig University, during their academic and clinical phases.

Method

A prospective cohort study was conducted at faculty of medicine, Zagazig University during period from the beginning ofof March 2017 to the end of August 2019 among medical students from third grade(academic phase) till fifth grade (clinical phase).

Assuming the (mean±standard deviation) of stress score among medical students is (14.55±8.68) and after 1 year became (17.78 ±5.03) [(18)], at confidence level 95%, power 80%, sample was 152 students using open Epi software. And assumingdropout of 20%, sample size was inflated to be 182 students.

A representative sample was taken from3rd grade medical students during academic phase by simple random sampling technique from Student lists, and then followed for about two years. From 182 students who were selected by simple random sampling technique, only 176 students agreed to participate in the study. But only 163 students completed the study to the end.

Regular Medical students (**3rd**grade) during academic phase of both sexes who agreed to participate in the study and students who did not fail in exams in any of the first two years (1st or 2nd grades) are allowed to participate in the study.

3rd grade Medical students who suffered from chronic medical disease or psychiatric disorder including (anxiety, psychosis or personality disorders) and other students in any grade other than the third one at the beginning of the study were excluded.

***Study tools*:**

Interview questionnaires:The students completed a structured questionnaire which took about (30 mint) to be completed.Questionnaire was administered in English with no translation into Arabic as medical students would understand English. It consisted of five parts:

First part - a structured questionnaire to collect personal data of the medical students (Age, residence, rank in the grade just before the interview (2nd grade in first visit and 4th grade in the second visit), residence, living in hostel, having extracurricular activities or history of medical, surgical or psychiatric disorders

Second part-Assessment of socio-economic level by using updated scale of Elgilany et al.[19]: Socio-economic score less than 50% (low), score 50%- less than

75% (middle) and score 75% and more (high).

Third part -The Perceived Stress Scale (PSS): is the psychological tool most used for assessing stress perception. It is a measure of the degree to which circumstances are evaluated as stressful in one's life. It consisted of 10 items; inquiring about last month's feelings and thoughts. Students were asked, in each case, how often they felt a certain way. Answers have been scored as: 0= Never 1= Almost Never 2= Sometimes 3= Fairly Often 4= Very Often. The reversal score was for the four positively stated items (items 4, 5, 7, & 8) where (0= 4, 1= 3, 2= 2, 3= 1 & 4 =0) and then all scale items were summed up.Scores of 0-13 were considered low stress, scores of 14-26 and 27-40 were considered moderate and high stress, respectively**.** **(20)**

Fourth part: Medical Students Stressor Questionnaire (MSSQ):It is used to assess sources of stress.It composed of 40 MSSQ items, representing (40) events.These events were reported as likely sources of stress among medical students.Stressors were classified into six domains, each based on a common underlying theme[21]:

1. Academic-related stressors (ARS): any academic, university, college, educational or student event that causes stress to students.
2. Intrapersonal and interpersonal related stressors (IRS): any kind of relationships that trigger stress between and within individuals
3. Teaching and learning-related stressors (TLRS): any activities related to teaching or studying that cause stress.
4. Social Stressors (SRS): any type of community relationships and social relationships that trigger stress
5. Drive and desire related stressors (DRS): any type of internal or external forces influencing one 's attitude, emotions , thoughts and behaviors that subsequently trigger stress.
6. Group activity related stressors (GARS): any activities and interactions that cause stress. It is generally related to participation in group discussions, presentations and other expectations of a successful outcome.

Students have been asked to respond to each event by rating the event themselves in recent weeks. Rating is done by choosing from five responses: 'no stress at all,' 'no stress at all,' 'no stress at all,' 'no stress at all,' 'no stress at all,' 'no stress at all,' and 'no stress at all. MSSQ is scored by giving a value of (0-4) for each response to each event.[21]

Fifth part: Brief scale of COPE: is used to test Coping strategies. This is a self-report questionnaire used to evaluate a number of different coping behaviors and to respond to a specific situation. Brief COPE is made up of 28 items**.** Every item on the scale was scored on a Likert scale of 4 points. The rating was, '1 = I haven't done it at all,' '2 = I did it a little bit,' '3 = I did it a small amount,' and '4 = I did it a ton.' Higher score suggests better student coping. The products generated 14 dimensions, with 2 objects per dimension. Each dimension represented the use of a particular coping method, including: self-distraction, active coping, denial, use of drugs, use of emotional support, use of instrumental support, disengagement from behavior, venting, constructive reframing, preparation, humor, acceptance, religious belief, and self-blame **(22).** Two main factors suggested subsequent factor-analysis; avoidant and approach coping. The sub-scales of humor and religion did not load on either of the above factors and therefore did not fall within either factor**(22)**. At the end; the questionnaire contained 24items. Scores were presented for each of the following subscales as

following:- Avoidant coping: self-distraction(items 1 & 19), denial (items 3 & 8), substance use (items 4 & 11), behavioral disengagement (items 6 & 16), venting (items 9 & 21) and self-blame (items 13 & 26).- Approach coping: active coping (items 2 & 7), emotional support (items 5 & 15), use of informational support (items 10 & 23),

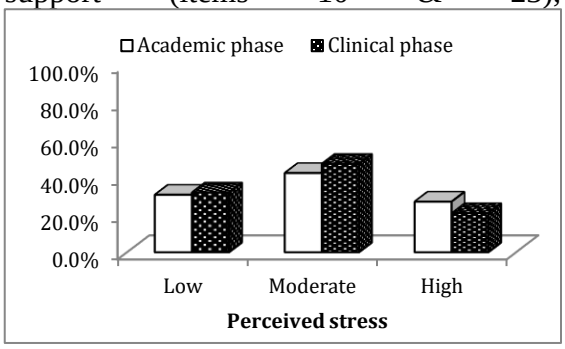


Figure (1):Stress level among the medical students during academic and clinical years (p>0.05)

positive reframing (items 12 & 17), planning (items 14 & 25) and acceptance (items 20 & 24).

II. Clinical examination of all the students to determine BMI (as obesity can disturb body image and may itself distress students). Comprehensive clinical examination was done to rule out chronic medical diseases.

A pilot study was conducted on 18 students(10% of the sample size) to test the study feasibility and consistency of the research methods and to calculate the time required to complete each questionnaire. No questions were changed, and the questionnaire was completed within approximately 30 minutes, so they were included in the study.

Field work: Students who fulfilled inclusion criteria were interviewed during3rd grade (academic phase) and then re-interviewed again during 5th grade (clinical phase).

Dean of the Faculty of Medicine Zagazig University accepted the study. An official letter of permission was obtained from the authority and sent to the student heads of department.

Statistical analysis

Data analysis was accomplished using the software SPSS (Statistical Package for the Social Sciences) version 20. Quantitative data was represented using means and standard deviations. Categorical variables were designated using their absolute frequencies. Kolmogorov-Smirnov (distribution-type) and Levene (homogeneity of variances) tests were utilized to prove suppositions for use in parametric tests. For paired non-parametric quantitative variables, Wilcoxon signed rank test (Wx) was used to compare means of two groups For categorical variables, Chi square (χ^2) and Fisher's exact tests were used to compare the studied groups. For paired binary categorical variable, McNemar test was used. Binary regression analysis was done to evaluate risk factors for moderate to high stress. P value <0.05 was considered statistically significant, p ≤0.001 was considered as highly significant.

Ethical approval

Throughout the entire study, ethical considerations were taken including fully informed students with the purpose and nature of the study and then oral consent was taken from them. Anonymity was used to guarantee privacy. The institutional review board (IRB) provided official approval (ZU-IRB # 5752).

Results

Eighty-two students (50.3%) were females, About 34% and 40% belonged to high and middle social classes respectively. Ninety-one students (55.8%) residing rural areas (Table 1 and 2)

In academic phase, 25.2%, 22.1%, 31.3% and 21.5% had fair, good, very good and excellent ranks in the 2nd grade respectively while in clinical phase. 21.5%, 17.2%, 30.7% and 30.7% had fair, good, very good and excellent ranks in 4th grade respectively (Table 1 and 2)

In academic phase, 40.5% and 11.6% were overweight and obese respectively while in clinical phase, %50.3 and 9.8 were overweight and obese respectively (Table 1 and 2)

Table (1): Relation Between Stress Level and Baseline Data in Academic and Clinical Phases

	Academic phase				Clinical phase			
	Total	Mod and high stress	p	COR (95%CI)	Total	Modand high stress	p	COR (95%CI)
	N=163(%)	n=119(%)			N=163 (%)	N=108 (%)		
Sex:								
male	81 (49.7)	58 (71.6)	0.689	1 (reference)	81 (49.7)	54 (66.7)	0.913	1 (reference)
female	82 (50.3)	61 (74.4)		1.15 (0.58-2.3)	82 (50.3)	54 (65.9)		1.04(0.54-1.99)
SES:								
High	55 (33.7)	49 (89.1)		1 (reference)	55 (33.7)	10 (18.2)		1 (reference)
Middle	65 (40)	47 (72.3)	<0.001	0.32 (0.12- 0.88)	65 (40)	58 (89.2)	<0.001	44.7 (15.9 – 125.9)
Low	43 (26.3)	23 (53.5)		0.14 (0.05 – 0.4)	43 (26.3)	40 (93)		72 (18.6 – 278.7)
Residence:								
Rural	91 (55.8)	67 (63.6)	0.841	1.07 (0.54 – 2.15)	91 (55.8)	80 (87.9)	<0.001	11.43 (5.19 – 25.1)
Urban	72 (44.2)	52 (72.2)		1 (reference)	72 (44.2)	28 (38.9)		1 (reference)
Academic Rank:								
Fair	41 (25.2)	33 (80.5)	0.82	0.69 (0.2 – 2.33)	35 (21.5)	31 (88.6)	<0.001	10.7 (3.28 – 34.94)
Good	36 (22.1)	26 (72.2)		0.43 (0.13 – 1.43)	28 (17.2)	22 (78.6)		5.06 (1.75 – 14.66)
Very Good	51 (31.3)	30 (58.8)		0.24 (0.08 – 0.71)	50 (30.7)	34 (68)		2.94 (1.3 – 6.65)
Excellent	35 (21.5)	30 (85.7)		1 (reference)	50 (30.7)	21 (42)		1 (reference)
Living in university hostel:			0.237				0.055	
Yes	64 (39.3)	50 (78.1)		2.04 (0.99 – 4.19)	78 (47.9)	51 (65.4)		0.5 (0.25 – 1.02)
No	99 (60.7)	63 (69.7)		1 (reference)	85 (52.1)	67(67.1)		
BMI:								
Average	78 (47.9)	55 (70.5)	0.75	1 (reference)	65 (40)	30 (46.2)	<0.001	1 (reference)
Overweight	66 (40.5)	48 (72.7)		1.11 (0.54 – 2.31)	82 (50.3)	64 (78)		4.15 (2.03 – 8.48)
Obese	19 (11.6)	16 (84.2)		2.23 (0.59 – 8.4)	16 (9.8)	14 (85.7)		8.17 (1.72 – 38.86)
Stress in academic phase:								
Low					44 (27)	24 (54.5)		1 (reference)
Mod to high					119 (73)	84 (70.6)	0.063	2 (0.98 – 4.08)

COR Crude odds ratio CI Confidence interval BMI Body mass index SES Socioeconomic standard

About 39% and 48% lived in hostel during academic and clinical phases respectively (Table 1 and 2)

About 31%, 42% and 27% had low, moderate and high stress levels during academic years which non-significantly changed to about 32%, 47% and 21% with those stress levels respectively (figure 1)

There was statistically non-significant relation between stress level and either sex, residence, rank, living in hostel or BMI. Male sex rural residence, overweight, obese, living in university hostels non-significantly increased risk by 1.15,1.07, 1.11, 2.23 and 2.04 folds respectively. Fair, good, very good ranks were non-significant protector against high stress (Table 1).

On the other hand, there was significant relation between stress level and social class. Middle and low social class protected against higher stress levels (Table 1)

There was statistically non-significant relation between stress level and both sex, living in university hostel, and perceived stress in academic phase. Sex and living in hostels was non-significant protector against high stress (Table 1).

There were statistically significant relation between stress level and residence, social class, academic rank and BMI. Low, middle SES, rural residence, overweight, obese, Fair, good, very good ranks increased risk by 44.7, 72, 11.43, 4.15, 8.17, 10.7, 5.06, and 2.94 folds respectively (Table 1). On doing regression analysis for significant

factors detected in univariate analysis, Fair rank,low and middle social classwere significant independent predictors

Table (2): Predictors of Stress among Students in Clinical Phase

	β	p	AOR	95% C.I.	
				Lower	Upper
Average BMI		0.078			
Overweight	-1.028	0.141	0.358	0.091	1.408
Obese	1.623	0.144	5.068	0.574	44.780
Excellent rank		0.024*			
Rank (Fair)	2.327	0.011*	10.243	1.709	61.405
Rank (Good)	-0.872	0.290	.418	0.083	2.103
Rank (Very good)	0.272	0.700	1.313	0.328	5.254
High social class		<0.001**			
Low social class	4.580	<0.001**	97.503	19.497	487.616
Middle social class	5.225	<0.001**	185.776	26.975	1279.432

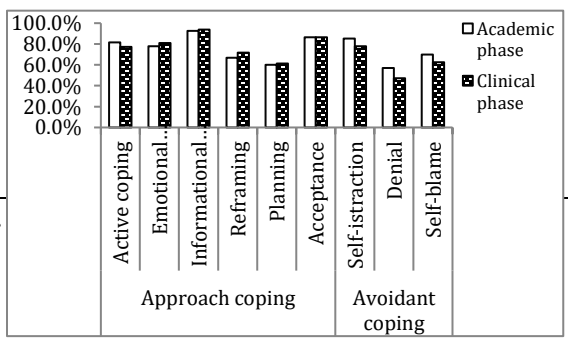
*AOR adjusted odds ratio CI Confidence interval BMI Body mass index **p≤0.001 is statistically highly significant *p<0.05 is statistically significant*

Table (3): Severity of Stressors among The Medical Students in Both Phases

Stressors	Academic years	Clinical years	MCN	p
	N(%)	N(%)		
ARS:				
Mild to moderate	60 (36.8)	59 (36.2)		
High to severe	103 (63.2)	104 (63.8)	0	>0.999
IRS:				
Mild to moderate	100 (61.3)	72 (44.2)		
High to severe	63 (38.7)	91 (55.8)	13.018	<0.001**
TRS:				
Mild to moderate	72 (44.2)	93 (57.1)		
High to severe	91 (55.8)	70 (42.9)	8.889	0.003*
SRS:				
Mild to moderate	72 (44.2)	41 (25.2)		
High to severe	91 (55.8)	122 (74.8)	15.789	<0.001**
DRS:				
Mild to moderate	86 (52.8)	81 (49.7)		
High to severe	77 (47.2)	82 (50.3)	0.291	0.59
GRS:				
Mild to moderate	74 (45.4)	81 (49.7)		
High to severe	89 (54.6)	82 (50.3)	0.973	0.324

*ARS- Academic related stress; IRS– Interpersonal/intrapersonal related stress; TLRS–Teaching related stress; SRS– Social related stress; DRS- Desire related stress; GARS -Group activities related stress. MCN McNemartest **p≤0.001 is statistically highly significant *p<0.05 is statistically significant*

for higher stress level (AOR=10.243, 97.503 and 185.776, p<0.05). Being obese non-significantly increased risk of stress by 5.069 folds. Being overweight, having



good and very good ranks were non-significant protectors (p>0.05) (Table 2)

Larger percentage of students (63.2%) had high to severe stress academic stressors in academic phase which non-significantly increased to 63.8% in clinical phase. Concerning IRS, 38.7% had high to severe stress in academic phase which increased significantly to 55.8% in clinical phase.

Figure (2): Coping strategies among medical students during academic and clinical phases

High to severe TRS had decreased significantly from 55.8% to 42.9% in clinical phase. Concerning SRS, high and severe stress increased significantly from 55.8% to 74.8%. High to severe DRS changed non-significantly from 47.2% in academic phase to 50.3% in clinical phase. High to severe GRS non-significantly changed from 54.6% in academic phase to 50.3% in clinical phase (Table 3).

Table (4): Coping Strategies among The Students in Both Phases

	Academic years N=163	Clinical years N=163	Wx	p
Approach:				
Median	23	30	-	<0.001**
Range	12 – 48	13 – 48	6.614	
Avoidant				
Median	22	23	-	0.72
Range	10 – 48	12 – 48	0.359	

*Wx Wilcoxon signed rank test **p≤0.001 is statistically highly significant*

On studying coping strategies of medical students, approach coping score significantly increased from 23 in academic years to 30 in clinical years. Avoidant coping score did non-significantly change from 22 to 23 (Table 4)

Active coping decreased from 81.6% to 79.8%, (p=0.25), emotional support increased from 62.6% to 81% (p<0.001), informational support changed from 77.3% to 93.9% (p<0.001), reframing changed from 66.9% to 71.8% (p=0.039) and acceptance increased from 76.1 and 92.6% (p<0.001), planning non-significantly increased from 60.1% to 61.2%. Avoidant coping approaches adopted were self-distraction (which decreased from 85.3% to 84%, p=0.5), self-blame (decreased from 69.9% to 68.1%, p=0.25) and denial (that decreased from 57.1 to 55.8%, p=0.5). Other mechanism of avoidant coping were not adopted in either academic or clinical phases (Figure 2).

Discussion

Medical students are falling under stress and the question here was to quantify level of stress along two main phases of college, identify predictors of stress, to highlight major stressors and to identify coping strategies they adopt. Results of the current study revealed that 27% and 20.7% of students perceived high level of stress during their academic and clinical phases respectively. As the students advanced in their medical education, they areexpected to master learning skills to alleviate some of perceived stress they suffered. Academic work load remainsa triggerfor stress.

In an earlier Egyptian study done in Fayoum University on medical students on 4th year, 62.5% suffered from stress.[12] This agreed with this study where 69.3% and 68.1% suffered from moderate to high stress.

Previous studies in Saudi Arabia, 71.9% and 57% of students had stress.[23-24]These rates are very close which refer to that medical education everywhere is a stressful event.

On identifying predictors of moderate to high stress in each phase, in academic phase, only social class was significantly associated to stress. Middle and low social class protected against higher stress levels.

In clinical phase, fair academic rank, rural residence, low and middle social classes were significant independent predictors for higher stress level. Being obese non-

significantly increased risk by 5.069 folds. Ranking as fair put the students at risk of failure and this puts them in a heavy load especially in clinical phase where curricula are larger and exams are so numerous. Lower social class in clinical phase may hinder achievement of students either in purchasing materials, accessing educational sources or feeling unsupported so they should only study to gain a prestigious position. Obesity may hinder scholar achievement or make students have low self-esteem.[25]Obesity still acts as risk factors for major health problems and being aware of risk they face increases perceived stress. Rural residence means that either students travel to college daily which represents academic, physical and financial loads or that they need to reside university hostel or private platform which add financial and emotional burdens.

Stress score significantly related to advancing age, lower SES, higher BMI while the relation was not significant between stress and either residence and exercise as denoted in a previous study [(12)]

A former research in Menoufiya University concluded that stress was significantly linked to sex, rural residence, SES, loneliness, and participating in social events.[8]

In a previous study, total prevalence of stress was 63%, (severe stress was prevalent in 25%). The prevalence of stress was higher among females (COR=2.3, p<0.0001). PSS level significantly dropped as the students advanced in study year except for the graduation year. Students' academic rank was not significantly associated with the stress level.[26]

Academic and family sources of stress were statistically significantly more in medical than in nonmedical students according to a former research.[27]

Sex had non-significant association with stress in contrast to other studies have concluded that females were more prone to psychological symptoms than males [(10, 28)]. Females maybe more emotionally liable and as they focus mainly on studying, they may be so sensitive to perceive academic load and suffer more from social restriction medical education causes.

Exams, contacts with patients and autopsy were described as high stressors that are significantly more frequent in female students.[29]

Vitaliano et al. identified stressors facing medical students into academic pressure, social issues and financial problems.[30]Yet MSSQ classifies more sources of stressors medical students face.[21]

Concerning source of stressors, in academic phase, ARS and TRS, SRS and GRS represented 63.2%, 55.8%, 55.8% and 54.6% while in clinical years, SRS, ARS, IRS represented major stressors by 74.8%, 63.8% and 55.8% respectively. IRS, and SRS significantly increased in clinical years while TRS significantly decreased.

Previously studied curricular factors, academicconcerns, extensive hours spent in studying, higher parental expectations, littletime available for leisure and sleeping constrains represented the main stressors facing students.[31-34]

Shanker et al.[35] in their study, denoted that the chief sources of stress were ARS and GARS.

Frequency of examinations, time management, and academic workload were branded as the key stressors in academic students according to a previous study recruited in United Arab Emirates.[14]

Social stressors are to be considered. Medical students suffered from social deprivation. They cannot easily incorporate in social activities. Every time, they either had a lot to do either studying, preparing for exams or are being examined. This also refer again to

academic stressors. Hence, SRS significantly increases as students advance in their medical education. TRS can be a big source of stress in academic phase as students transfer from school phase to college phase with major variations either in studying, amount of information and exams, feeling independent or in some circumstances, leaving their homes and moving daily to college or living in hostels. In clinical phase, they are accustomed to most of these events so TRS significantly decreases in clinical phase.

This point of view agreed with a previous research.[36]Problem-based learning (PBL) approaches can attribute to stress burdens medical students who have to move from a principally teacher-centered to a student-centered learning style. They ought to deal with the burden of performing in small group sessions.[36]

However, PBL curricula are expected to build social support by peers and faculty. PBL is expected to provide more supportive learning environment. As medical schools modify their curricula, the psychological influence should be checked to prevent an increase in stress and depression.[35]

In a study conducted in Nigeria, Academic factor (86%) was reported as the highest factor contributing to stress among medical students.[37]

Academic stressors represented the highest source of stress in large numbers of studies. This can be attributed to exam tension, disproportionate curricula to time supposed they will consume to study them, time shortage for studies, last minute exam preparation due to the on-going weekly tests, vast subjects to read, ward round and lack of time for recreation.

Medical students indicated some perceived illness that could be caused by stress: depression, sadness, anxiety, restlessness, nervous and many others. It was indicated that large amount of extracurricular activities (including researches outside the traditional curriculum. It also includes curricula that are not added to academic rank as Human right and English. Also, it included physical activities, music, reading and social activities) carried out by students leads to stress and also difficulty in memorizing what they are been taught in class could lead to stress.[37]

On studying coping strategies of medical students, approach coping score significantly increased from 23 in academic years to 30 in clinical years. Avoidant coping score non-significantly increased from 22 to 23. This is a good indicator as approach coping significantly increased while avoidant coping had decreased. Active coping and emotional support represented the most prevalent technique in academic and clinical phases. While self-distraction, self-blame and denial were the techniques adopted for avoidant coping.

Active coping (including concentrating ones' efforts on doing something about the situation and having actions to make situation better) decreased from 81.6% to 79.8%, emotional support increased from 62.6% to 81%, informational support rised from 77.3% to 93.9%, reframing changed from 66.9% to 71.8%, planning increased from 60.1% to 61.2% and acceptance increased from 76.1 and 92.6%. Avoidant coping approaches adopted were self-distraction (decreased from 85.3% to 84%), self-blame (decreased from 69.9% to 68.1%) and denial (changed from 57.1 to 55.8%).

Active coping, reframing and use of informational support represented the most prevalent approach coping during academic phase. On the other hand, emotional, informational support, and acceptance represented the most adopted approach coping in clinical years.

Regarding avoidant coping, only self-distraction, denial and self-blame were only adopted during both phases.

Other studies revealed that self-distraction, active coping, positive reframing, planning, and acceptance in agreement with the current study.[37] While in the UAE, students adopted various coping strategies including praying, planning and learning from the experience.[14]

In Nigeria, use of religion, planning, acceptance, instrumental support, and denial were frequently utilized.[37] In our study, no student reported substance abuse. While, it had the lowest score as a coping strategy in other studies.[14,37,38]

This point should be strengthened as adopting approach coping and getting away from avoidant coping is a promising. Substance abuse was denied by all respondents.

Conclusion

Medical studying is a stressful event that threatens physical and mental well-being of them. Academic and social stressors are the most frequent types during both academic and clinical phases. Approach coping was higher among academic phase and significantly increased in clinical phase with regression of avoidant coping

Recommendation

Paying attention to medical students, trying to alleviate academic stressors, incorporating them in leisure activities, improving evaluation tools, focusing on students at high risk for perceiving major stress should be adopted to improve outcome of educational process. Psychiatric counseling should be part of every year screening system for medical students. Combating obesity by physical exercise and healthy food can also help lessen perceived stress among medical students. Large scale studies should be applied on students incorporating in the new medical education system to critically appraise it.

Strength and Limitation

One of the strength points of the study was that the same student was interviewed twice in both phases. Being prospective cohort study means that recall bias were eliminated

Depending on subjective tools without objective assessment represented the most important limitation in this study. Also being applied in a single university was also another limitation.

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References

1. Vaishali T, Mittal S, Vaidehi U. To study the level of stress in the students and identify the stress relieving methods used by them. Indian J Physical Ther. 2013;1(2):20-3.

2. Al Shawi AF, Abdullateef AN, Khedher MA, Rejab MS, Khaleel RN. Assessing stress among medical students in Anbar governorate, Iraq: a cross-sectional study. The Pan African medical journal. 2018;31.

3. Bamuhair SS, Al Farhan AI, Althubaiti A, Agha S, Ibrahim NO. Sources of stress and coping strategies among undergraduate medical students enrolled in a problem-based learning curriculum. Journal of Biomedical Education. 2015;2015.

4. Su S, Wang X, Pollock JS, Treiber FA, Xu X, Snieder H, McCall WV, Stefanek M, Harshfield GA. Adverse childhood experiences and blood pressure trajectories from childhood to young adulthood: the Georgia stress and Heart study. Circulation. 2015 May 12;131(19):1674-81.

5. Hysenbegasi A, Hass SL, Rowland CR. The impact of depression on the academic productivity of university students. Journal of

mental health policy and economics. 2005 Sep 1;8(3):145.
6. Waghachavare VB, Dhumale GB, Kadam YR, Gore AD. A Study of Stress among Students of Professional Colleges from an Urban Area in India. Sultan Qaboos University Medical Journal. 2013 Aug;22(1060):1-6..
7. Reang T, Bhattacharjya H. A study to assess the emotional disorders with special reference to stress of medical students of agartala government medical college and govindaballabh pant hospital. Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine. 2013 Oct;38(4):207.
8. Abdallah AR, Gabr HM. Depression, anxiety and stress among first year medical students in an Egyptian public university. Int Res J Med Med Sci. 2014 Feb;2(1):11-9.
9. El-Gilany AH, Amr M, Hammad S. Perceived stress among male medical students in Egypt and Saudi Arabia: effect of sociodemographic factors. Annals of Saudi medicine. 2008 Nov;28(6):442-8.
10.Amr M, El-Gilany A, El-Sayed M, El-Sheshtawy E. Study of stress among medical students at Mansoura University. Banha Med J. 2007;37(5):25-31.
11.Carter AO, Elzubeir M, Abdulrazzaq YM, Revel AD, Townsend A. Health and lifestyle needs assessment of medical students in the United Arab Emirates. Medical Teacher. 2003 Jan 1;25(5):492-6.
12.Wahed WY, Hassan SK. Prevalence and associated factors of stress, anxiety and depression among medical Fayoum University students. Alexandria Journal of medicine. 2017;53(1):77-84.
13.Shah C, Trivedi RS, Diwan J, Dixit R, Anand AK. Common stressors and coping of stress by medical students. Journal of clinical and diagnostic research. 2009 Aug;3(4):1621-6.
14.Gomathi KG, Ahmed S, Sreedharan J. Causes of stress and coping strategies adopted by undergraduate health professions students in a university in the United Arab Emirates. Sultan Qaboos University Medical Journal. 2013 Aug;13(3):437
15.Prinz P, Hertrich K, Hirschfelder U, de Zwaan M. Burnout, depression and depersonalisation–Psychological factors and coping strategies in dental and medical students. GMS ZeitschriftfürmedizinischeAusbildung. 2012;29(1).
16.Ebrahimi H, Atri SB, Ghavipanjeh S, Farnam A, Gholizadeh L. The effect of training problem-solving skills on coping skills of depressed nursing and midwifery students. Journal of caring sciences. 2013 Mar;2(1):1.
17.Wigman JT, Devlin N, Kelleher I, Murtagh A, Harley M, Kehoe A, Fitzpatrick C, Cannon M. Psychotic symptoms, functioning and coping in adolescents with mental illness. BMC psychiatry. 2014 Dec;14(1):97.
18.Goel AD, Adarte SV and Yadav V. Longitidunal assessment of depression, stress and burnout in medical students. J of neurosci in rural pract. 2016; 7(4): 493-8.
19.El-Gilany A, El-Wehady A, El-Wasify M. Updating and validation of the socioeconomic status scale for health research in Egypt. Eastern Mediterranean Health Journal. 2012 Sep 1;18(9).
20.Cohen, S., Kamarck, T., and Mermelstein, R. A global measure of perceived stress. Journal of Health and Social Behavio 1983r, 24, 386-396.
21.Yusoff MS, Rahim AF, Yaacob MJ. The development and validity of the Medical Student Stressor Questionnaire (MSSQ). ASEAN Journal of Psychiatry. 2010 Jan 1;11(1):231-5.
22.Carver CS. You want to measure coping but your protocol'too long: Consider the brief cope. International journal of behavioral medicine. 1997 Mar 1;4(1):92.
23.Sani M, Mahfouz MS, Bani I, Alsomily AH, Alagi D, Alsomily NY. Prevalence of stress among medical students in Jizan University, Kingdom of Saudi Arabia. Gulf Med J 2012;1 (1):19–25.
24. Abdulghani H. Stress and depression among medical students: a cross sectional study at a medical college in Saudi Arabia. Pak J. Med Sci 2008;24:12–7.
25.Alghawrien D, Al-Hussami M, Ayaad O. The impact of obesity on self-esteem and academic achievement among university students [published online ahead of print, 2020 Jun 1]. Int J Adolesc Med Health.

2020;/j/ijamh.ahead-of-print/ijamh-2019-0137/ijamh-2019-0137.xml. doi:10.1515/ijamh-2019-0137 (last accessed on 14 June 2020)
26.Abdulghani HM., et al. "Stress and its effects on medical students: a cross-sectional study at a college of medicine in Saudi Arabia". Journal of Health, Population and Nutrition 29.5 (2011): 516-522.
27.Labib NA, Barakat AA, El Sherbiny N, Ebrahim E. Stress Profile among Fayoum University Students. Egypt J Commun Med 2010;28:59–71.
28.Ibrahim MB, Abdelreheem MH. Prevalence of anxiety and depression among medical and pharmaceutical students in Alexandria/University Faculty of Medicine, Alexandria University.Alexandria J Med 2015;51:167–73
29.Backovic´1 D, Z˘ ivojinovic´1 J, Maksimovic´ J, Maksimovic´ M. Gender difference in academic stress and burnout among medical students in final years of education. PsychiatDanubina 2012;24(2):175–81
30.Vitaliano PP et al. Medical school pressures and their relationship to anxiety. J NervMent Dis 1984; 172(12): 730–736.
31.Soliman, Perception of stress and coping strategies by medical students at King Saud University, Riyadh, Saudi Arabia. Journal of Taibah University Medical Sciences (2014) 9(1), 30–35
32.Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among US and Canadian medical students. Acad Med 2006; 81(4): 354–373.
33.Pereira MA, Barbosa MA. Teaching strategies for coping with stress—the perceptions of medical students. BMC Med Educ 2013; 13: 50.
34.Shah M et al. Perceived stress, sources and severity of stress among medical undergraduates in a Pakistani medical school. BMC Med Educ 2010; 10: 2.
35.Shankar PR, Balasubramanium R, Ramireddy R, Diamante P, Barton B, Dwivedi NR.Stress and Coping Strategies among Premedical and Undergraduate Basic Science Medical Students in a Caribbean Medical School. Education in Medicine Journal 2014: 6(4) e48-e56
36.Lewis AD,MenezesDA,McDermottHE,HibbertLJ,BrennanSL,Ross EE, Jones LA. Acomparisonofcourse-relatedstressorsinundergraduateproblem-basedlearning(PBL)versusnon PBLmedicalprogrammes.BMC MedEduc.2009;9:60.
37.Shoda MA and Titiloye MA. Perceived Stress and Coping Mechanism Among Medical Students of University of Ibadan, Nigeria. Acta Scientific Nutritional Health 3.9 (2019): 128-134.
38.Yussuf AD, Issa BA, Ajiboye PO, Buhari OI. The correlates of stress, coping styles and psychiatric morbidity in the first year of medical education at a Nigerian University. Afr J Psychiatry (Johannesbg). 2013;16:206-1