

# **RESEARCH ARTICLE**

#### THE ASSOCIATION BETWEEN EATING DISORDERS AND STRESS AMONG MEDICAL STUDENT: A CROSS-SECTIONAL STUDY

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#### Abstract

**Introduction:** Eating disorders (EDs) primarily psychiatric conditions still under-reported in Saudi Arabia, especially among medical students who are mostly in the high-risk groups for their teenage period and exposure to stress. Therefore, this study evaluated the association between eating disorders and stress among medical students in Tabuk, Saudi Arabia.

**Methods:** A cross-sectional study was conducted at the College of Medicine, Tabuk University, Tabuk, Saudi Arabia, on medical students using the Eating Attitudes Test (EAT-26), and Perceived Stress Scale (PSS). Pearson's correlation and chi-square test were used to correlate and compare variables with p<0.05 for statistical significance.

**Results:** We received 373 responses. Most respondents were aged 21-23 years (41.8%), 60.3% were female, 98.6% were single, 13.9% had medical conditions, 15.3% were smokers, and 47.5% reported rarely or never doing physical exercises. We found a mean EAT score of  $15.28 \pm 13.3$  and a mean PSS score of  $20.59 \pm 4.7$ . Respondents at high risk of EDs were 27.9%, and 82.8% had moderate stress levels. Medical conditions (p=0.005) and physical exercises (p=0.035) significantly positively correlated with a high risk of EDs.High stress levels were associated with smoking (p=0.032), medical conditions (p=0.027), female gender (p=0.003) and poor academic performance (0.009). This study determined no statistically significant association between EDs and perceived stress levels (P=0.285).

**Conclusion:** These findings indicate that EDs risks and stress levels are high among medical students, highlighting the need for addressing the issue. Though no significant association between EDs and perceived stress levels could be established, stress is predominant among the studied students and should be addressed to produce high-quality medical doctors.

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### Introduction:-

Eating disorders (EDs) are a group of conditions that involve either insufficient or excessive food intake, with the

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most common being binge eating disorder, anorexia nervosa and bulimia nervosa [1,2]. The disorders are present in people of all age groups, but adolescents and students are the most affected [1]. EDs patients are mostly preoccupied with their body shape, weight and diet to keep themselves in their perceived measurements. The exact cause is still unknown, but it is hypothesized that biological, psychological and other factors such as socioeconomic status, stress, and currently, social media are associated with EDs [1,3]. EDs are classified among the dangerous psychiatric illnesses that can lead to death either from suicide or associated life-threatening physical conditions and deteriorated quality of life [3,4].

People with binge eating disorders react to stressful events by binge eating a lot of food to discomfort and are often ashamed, distressed or guilty, but they don't try to get rid of eaten food the way people with bulimia do [3]. People with anorexia nervosa feel fat and don't eat enough food or don't exercise to control weight to the point of starving, leading to severe underweight. People with bulimia nervosa binge eat and purge to avoid weight gain. They usually induce vomiting but can also take laxatives to induce diarrhea or exercise too much. They can be in the normal weight range, which makes the diagnosis challenging to make and often spend a long time underdiagnosed [5]. EDs can be associated with depression, anxiety, suicide, and other medical conditions. These disorders can cause metabolic dysfunction leading to fertility difficulties, cardiovascular diseases and digestive disorders [4]. EDs during childhood and adolescence are associated with higher risks of physical health and mental health illnesses in the elderly [6].

An online survey that involved 1392 students (mean age:  $22 \pm 5$  years) from universities in the United States of America (USA), the Netherlands, South Korea, Malaysia, Ireland, Ghana, and China reported perceived stress and unhealthy eating among the majority. Increased stress was associated with increased EDs and BMI but with reduced sleep duration and age [7]. The female students in this study were at higher risk than male students. The study that was conducted on 315 medical students (in Casablanca, Morocco, indicated that the EDs incidence was 39.9%, with weight control and anxiety as associated factors [8]. Another study conducted at Qassim University, Saudi Arabia, on 614 undergraduate students showed 28.2% had stress and 22.3% of students were underweight, whereas 39.2% were obese, similar to the study from Kuwait that found obese students to have double risks of EDs compared to students with normal weight [9,10]. A study conducted at Taif University, Saudi Arabia, indicated a high prevalence of EDs among female students, and medical and obese students were at higher risks [11].

The medical field and education consist of high workloads and huge responsibilities with relatively reduced resting time, which amplifies medical students' high pressure and stress. Excessive distress coupled with young age and other physiological, socio-economic and environmental factors can put medical students at risk for EDs. EDs and stress have been reported more in female students than their male counterparts [12]. Stress has been reported among social and psychological factors for EDs, but there is a lack of studies assessing the relationship between eating disorders and stress among medical students in Saudi Arabia. Therefore, the goal of this study was to determine the association between eating disorders and stress among medical students in Tabuk, Saudi Arabia. Results from this study will help design strategies to prevent EDs and stress among medical students that would otherwise negatively affect the competency of future medical doctors.

## Methods:-

## Study design:

We conducted a cross-sectional study 1st January 2022 to 31st july 2022 at the College of Medicine, Tabuk University, Tabuk, Saudi Arabia, involving all medical students in the academic year 2021-2022 G. Non-medical students, pregnant students, and the university staff members were excluded.

#### Sampling:

The minimum sample size (n) calculated to achieve a precision of  $\pm 5\%$  with a 95% confidence interval was 384 using the formula below:

$$n = Z^2 x P x Q = n = (1.96)^2 x 0.5 x 0.5 = 384$$
  
 $D^2 (0.05)^2$ 

n: Calculated sample size

Z: The z-value for the selected level of confidence= 1.96.

P: 50%, assumed proportion of participants for maximum sample size calculation Q: (1 - P) = 50%.

D: The margin of error = 0.05.

Multistage sampling was used to recruit medical students. Stage I: Four class levels were randomly selected. Stage II: 96 medical students were recruited from each class using list of students by a systematic random sampling method to make 384 students in total.

#### **Data collection**

We used an anonymous questionnaire for data collection, was divided into 3 parts:

The first part collected socio-demographic and anthropometric data such as age, gender, nationalities, grade of medical studies, weight and height. The second part collected data on EDs using the Eating Attitude Test (EAT-26) questionnaire to screen students for EDs. EAT-26 is a standardized questionnaire that measures symptoms and concerns, and characteristics of ED. It has 26 items with 3 subscales: dieting, bulimia and food preoccupation, and oral control. The total score of EAT-26 is 78, and a cutoff point of  $\geq$ 20 indicates a person is at risk of ED. Each item has a 6-point Likert scale: Always, Usually, Often, Sometimes, Rarely and Never.

The third part assessed levels of stress using Cohen perceived stress scale, which includes 10 items regarding feelings and thoughts of the individual during the past month. Each item is rated on 5-point scale ranging from 0 (Never) to 4 (Almost Always). A total score of 0 to 12 indicates low-stress level, a total score of 13 to 20 indicates an average-stress level, and the total score of above 20 indicates a high-stress level.

The principal investigator approached the students at the college, informed them about the study and its objective and invited them to participate voluntarily. The questionnaires were handed over to the students to fill out and the investigator answered questions to make everything clear to all students selected.

#### **Statistical Analysis**

Date collected were analyzed and presented using IBM SPSS version 23 (IBM Corp., Armonk, N.Y., USA) and GraphPad Prism version 8 (GraphPad Software, Inc., San Diego, CA, USA). Categorical and nominal variables were presented in the form of frequencies (N) and percentages (%). Continuous variables, on the other hand, were presented through mean and standard deviations (SD). Reliability Analysis was employed using a model of Alpha (Cronbach) to study the properties of measurement scales and the items that compose the scales and the average inter-item correlation. For correlation analyses, Pearson's correlation coefficient was used to correlate variables represented by means. To establish a relationship between categorical variables, this study utilized chi-square test. These tests were done with the assumption of normal distribution. Lastly, a p-value of < 0.05 was the criteria to discard the null hypothesis.

## **Results:-**

We received responses from 373 students. Of all participants, 60.3% were female, 98.6% were single, 86.1% had no medical condition and 15.3% were smokers. Most participants were aged 21-23 (41.8%), followed by 18-20 age group (31.1%). The majority were fifth-year students (25.2%), followed by the second- and fourth-year students (24.1% and 16.1%, respectively). Only 9.1% reported poor academic performance. Though the majority (46.6%) had a normal BMI (18.5–24.9), 42.4% were cumulatively overweight and obese (BMI>30). The remaining 11% were underweight (BMI< 18.5). Most reported rarely or never doing physical exercises (47.5%), while 23.3%, 21.2%, and 8% reported doing exercises 1-2 times a week, 3-5 times a week and more than5 times a week, respectively. Detailed participants' characteristics are presented in Table 1.

		Ν	%
Gender	Male	146	39.1
	Female	227	60.9
Age	18-20	116	31.1
	21-23	156	41.8
	24-25	82	22.0
	26-28	19	5.1
Marital status	Single	367	98.4

**Table 1:-** DemographicsCharacteristics of the participants.

	Married	6	1.6
Academic year	First year	22	5.9
	Second year	90	24.1
	Third year	56	15.0
	Fourth year	60	16.1
	Fifth year	51	13.7
	Sixth year	94	25.2
Academic performance	Poor	34	9.1
	Good	144	38.6
	Very good	115	30.8
	Excellent	80	21.4
Smoking status	Smoker	57	15.3
	Non-smoker	316	84.7
Do you have any medical condition?	Yes	52	13.9
	No	321	86.1
BMI	Below 18.5(Underweight)	41	11.0
	18.5–24.9(Normal)	174	46.6
	25–29.9(Overweight)	90	24.1
	30 -34.9(Obese I)	36	9.7
	Above 35(Obese II-III)	32	8.6
How many times a week do you exercise?	Very rarely or never	177	47.5
	1–2 times a weak	87	23.3
	3–5 times a weak	79	21.2
	More than 5 a weak	30	8.0

The overall mean EAT and PSS scores, along with diet-related scores, are shown in Table 2. Results showed that the 373 participants obtained an average score of  $8.77 \pm 7.6$  (from 0 to 36) for dieting,  $2.71 \pm 3.6$  (from 0 to 18) for bulimia and food preoccupation,  $3.80 \pm 4.1$  (from 0 to 21). Moreover, the participants had a mean (SD) EAT score of  $15.28 \pm 13.3$  (from 0 to 75), below the cutoff point of  $\geq 20$ , which suggests a lower risk. They also had a mean PSS score of  $20.59 \pm 4.7$  (from 6 to 36), a value above the cutoff point score, suggesting a perceived stress risk. The eating attitude test showed that the majority of participants were at low risk of EDs (72.1%), most participants (82.8%) had moderate stress levels, 10.7% had high-stress levels and 6.4% had low-stress levels.

Table 2:- Overall mean EAT and PSS scores and diet-related scores amon	ig the studied	population	(N = 373)
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Domains		Ν	Min	Max	Mean	SD
Dieting		373	0	36	8.77	7.6
Bulimia and Food Preoccupation		373	0	18	2.71	3.6
Oral Control		373	0	21	3.80	4.1
Eating Attitudes Test		373	0	75	15.28	13.3
Perceived Stress Scale		373	6	36	20.59	4.7
				Ν		%
Total				373		100.0
Eating Attitudes Test	Low risk			269		72.1
	High risk			104		27.9
Perceived Stress Scale	Low stress		24			6.4
	Moderate stress			309		82.8
	High perceived stress			40		10.7

Min: Minimum; Max: Maximum; SD: Standard deviation

As shown in Table 3, a high risk of EDs was more likely to be among participants with medical conditions than those without medical conditions (25.2% vs. 44.2%) (p=0.005). The more frequently participants performed exercises, the more they were at high risk for EDs. Those who rarely or never exercise were the least to be at high risk for EDs (20.9%), while 35.6%, 31.6%, and 36.7% of those at high risk performed exercises 1-2 times, 3-5 times

and more than 5 times a week, respectively (p=0.035). There was no statistically significant correlation between risks for EDs and other participants' characteristics.

Demographics	mographics		Eating Att	p-value	
			Low risk	High risk	
Total		373	269(72.1%)	104(27.9%)	-
Gender	Male	146	105(71.9%)	41(28.1%)	0.945
	Female	227	164(72.2%)	63(27.8%)	
Age	18-20	116	76(65.5%)	40(34.5%)	0.295
	21-23	156	118(75.6%)	38(24.4%)	
	24-25	82	61(74.4%)	21(25.6%)	
	26-28	19	14(73.7%)	5(26.3%)	
Marital status	Single	367	266(72.5%)	101(27.5%)	0.223
	Married	6	3(50.0%)	3(50.0%)	
Academic year	First year	22	13(59.1%)	9(40.9%)	0.236
	Second year	90	63(70.0%)	27(30.0%)	
	Third year	56	37(66.1%)	19(33.9%)	
	Fourth year	60	42(70.0%)	18(30.0%)	
	Fifth year	51	42(82.4%)	9(17.6%)	
	Sixth year	94	72(76.6%)	22(23.4%)	
Academic performance	Poor	34	25(73.5%)	9(26.5%)	0.090
	Good	144	96(66.7%)	48(33.3%)	
	Very good	115	82(71.3%)	33(28.7%)	
	Excellent	80	66(82.5%)	14(17.5%)	
Smoking status	Smoker	57	40(70.2%)	17(29.8%)	0.722
-	Non-smoker	316	229(72.5%)	87(27.5%)	
Do you have any medical	Yes	52	29(55.8%)	23(44.2%)	$0.005^{a}$
condition?	No	321	240(74.8%)	81(25.2%)	
BMI	Below 18.5(Underweight)	41	27(65.9%)	14(34.1%)	0.130
	18.5–24.9(Normal)	174	129(74.1%)	45(25.9%)	
	25–29.9(Overweight)	90	69(76.7%)	21(23.3%)	
	30 -34.9(Obese I)	36	20(55.6%)	16(44.4%)	
	Above 35(Obese II-III)	32	24(75.0%)	8(25.0%)	
How many times a week do	Very rarely or never	177	140(79.1%)	37(20.9%)	0.035 <sup>a</sup>
you exercise?	1–2 times a weak	87	56(64.4%)	31(35.6%)	
	3–5 times a weak	79	54(68.4%)	25(31.6%)	1
	More than 5 a weak	30	19(63.3%)	11(36.7%)	1
<sup>a</sup> -significant using Chi-square to	est at <0.05 level.				

Table 3:- Eating attitudes of participants in relation to their characteristics.

As shown in Table 4, more male participants had low and moderate stress levels than female participants (10.3% vs. 4% and 84.2% vs. 81.9%, respectively), while 2.5 times more female participants had high-stress levels than males (14.1% vs. 5.5%) (p=0.003). Higher stress levels were found among more smokers and participants with medical conditions compared to non-smokers (p=0.032) and those without medical conditions (p=0.027).

Table 4:- Association between	perceived stress levels and	participants characteristics.
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Demographics		Tot		Perceived Stre	ess Scale	p-
		al	Low	Moderate	High perceived	value
			stress	stress	stress	
Total		373	24(6.4%	309(82.8%)	40(10.7%)	-
			)			
Gender	Male	146	15(10.3	123(84.2%)	8(5.5%)	0.003
			%)			а
	Female	227	9(4.0%)	186(81.9%)	32(14.1%)	

1 99	19.20	116	5(4, 20/)	06(92.90%)	15(12.00%)	0.000
Age	21.23	110	0(5.8%)	90(82.8%) 128(82.1%)	13(12.9%) 10(12.2%)	0.099
	21-23	82	6(7.3%)	71(86.6%)	5(6.1%)	
	24-23	19	$\Lambda(21.1\%)$	14(73.7%)	1(5.3%)	
	20-20	19	+(21.170	14(73.770)	1(3.370)	
Marital status	Single	367	)	304(82.8%)	39(10.6%)	0.743
ivia nai status	Shight	507	24(0.570	304(02.070)	57(10.070)	0.745
	Married	6	0(0.0%)	5(83.3%)	1(16.7%)	_
Academic year	First year	22	0(0.0%)	20(90.9%)	2(9.1%)	0.053
readenine year	Second year	90	5(5.6%)	72(80.0%)	$\frac{2(9.170)}{13(14.4\%)}$	0.055
	Third year	56	3(5.0%)	42(75.0%)	11(19.6%)	_
	Fourth year	60	2(3.3%)	51(85.0%)	7(11.7%)	_
	Fifth year	51	4(7.8%)	42(82.4%)	5(9.8%)	_
	Sixth year	9/	$\frac{10(10.6)}{10(10.6)}$	$\frac{42(32.470)}{82(87.2\%)}$	$\frac{3(9.8\%)}{2(2.1\%)}$	_
	Sixii year	74	10(10.0 %)	02(07.270)	2(2.170)	
Academic performance	Poor	34	2(5.9%)	22(64.7%)	10(29.4%)	0.009
	Good	144	6(4.2%)	125(86.8%)	13(9.0%)	a 0.005
	Very good	115	11(9.6%	95(82.6%)	9(7.8%)	
	very good	115	)	<i>))</i> (02.070)	)(1.070)	
	Excellent	80	5(6.3%)	67(83.8%)	8(10.0%)	_
Smoking status	Smoker	57	8(14.0%)	42(73,7%)	7(12.3%)	0.032
		0.	)	.=(/01//0)	/(1210/0)	a
	Non-smoker	316	16(5.1%	267(84.5%)	33(10.4%)	_
			)			
Do you have any medical	Yes	52	2(3.8%)	39(75.0%)	11(21.2%)	0.027
condition?	No	321	22(6.9%	270(84.1%)	29(9.0%)	a
			)	· · · ·	. ,	
BMI	Below	41	1(2.4%)	37(90.2%)	3(7.3%)	0.820
	18.5(Underweight)					
	18.5–24.9(Normal)	174	12(6.9%	146(83.9%)	16(9.2%)	
			)			
	25-	90	5(5.6%)	72(80.0%)	13(14.4%)	
	29.9(Overweight)					
	30 - 34.9(Obese I)	36	3(8.3%)	29(80.6%)	4(11.1%)	
	Above 35(Obese	32	3(9.4%)	25(78.1%)	4(12.5%)	
	II-III)					
How many times a week do	Very rarely or	177	12(6.8%	140(79.1%)	25(14.1%)	0.393
you exercise?	never		)			
	1–2 times a weak	87	4(4.6%)	78(89.7%)	5(5.7%)	
	3–5 times a weak	79	5(6.3%)	66(83.5%)	8(10.1%)	
	More than 5 a weak	30	3(10.0%)	25(83.3%)	2(6.7%)	
			)			
<sup>a</sup> -significant using Chi-square te	est at <0.05 level.					

Poor academic performance was significantly more among participants with high stress levels. On the other hand, participants with moderate and low stress levels had better performance (Figure 1).



**Figure 1:-** Distribution for the perceived stress scale (PSS) rates with respect to academic performance among the medical students (N = 373).

As shown in Table 5, high risk for EDs was significantly associated with more habits of binge eating with difficulty in stopping (p<0.001), self-induced vomiting (p<0.001), and the use of used laxatives, diet pills, or diuretics (water pills) (p<0.001) to control your weight or shape during the past six months. In addition, exercising for more than 60 minutes a day to lose or control weight and the loss of more than 9 kg or more in the past six months were significantly reported by more participants with a high risk of EDs (Both p<0.001).

In the past six months, have you		Total	Eating Attitudes Test		p-value
			Low risk	High risk	
Gone on eating binges where you feel that you	Yes	158	93(58.9%)	65(41.1%)	< 0.001 <sup>a</sup>
may not be able to stop?	No	215	176(81.9%)	39(18.1%)	
Ever made yourself sick (vomited) to control your	Yes	114	61(53.5%)	53(46.5%)	< 0.001 <sup>a</sup>
weight or shape	No	259	208(80.3%)	51(19.7%)	
Ever used laxatives, diet pills, or diuretics (water	Yes	75	33(44.0%)	42(56.0%)	< 0.001 <sup>a</sup>
pills) to control your weight or shape	No	298	236(79.2%)	62(20.8%)	
Exercised more than 60 minutes a day to lose or	Yes	148	91(61.5%)	57(38.5%)	< 0.001 <sup>a</sup>
control your weight	No	225	178(79.1%)	47(20.9%)	
Lost 20 pounds or more in the past six months	Yes	61	30(49.2%)	31(50.8%)	< 0.001 <sup>a</sup>
	No	312	239(76.6%)	73(23.4%)	
<sup>a</sup> -significant using Chi-square test at <0.05 level.					

**Table 5:-** Past 6-month habits association with risks for eating disorders.

However, there was no statistically significant correlation between past 6 month-habits and stress levels (P>0.05) (Table 6).

Table 6:- Past	6-month	habits	correlation	with	perceived	stress	levels.

In the past six months, have you		Total	J	Scale	p-value	
			Low stress	Moderate stress	High perceived stress	
Total		373	24(6.4%)	309(82.8%)	40(10.7%)	-
Gone on eating binges where you feel that	Yes	158	7(4.4%)	132(83.5%)	19(12.0%)	0.340

you may not be able to stop?	No	215	17(7.9%)	177(82.3%)	21(9.8%)	
Ever made yourself sick (vomited) to	Yes	114	5(4.4%)	96(84.2%)	13(11.4%)	0.555
control your weight or shape	No	259	19(7.3%)	213(82.2%)	27(10.4%)	
Ever used laxatives, diet pills, or diuretics	Yes	75	2(2.7%)	68(90.7%)	5(6.7%)	0.122
(water pills) to control your weight or	No	298	22(7.4%)	241(80.9%)	35(11.7%)	
shape						
Exercised more than 60 minutes a day to	Yes	148	6(4.1%)	128(86.5%)	14(9.5%)	0.232
lose or control your weight	No	225	18(8.0%)	181(80.4%)	26(11.6%)	
Lost 9 kg or more in the past six months	Yes	61	4(6.6%)	51(83.6%)	6(9.8%)	0.970
	No	312	20(6.4%)	258(82.7%)	34(10.9%)	

There was no significant association between EDs risks and perceived stress levels (P=0.285) (Table 7).

Table 7:- Correlation	between	EDs	risks	and	perceived	stress	levels
					1		

Variables		Total	Eating Attitudes Test		p-value
			Low risk	High risk	
Total		373	269(72.1%)	104(27.9%)	-
Perceived Stress Scale	Low stress	24	20(83.3%)	4(16.7%)	0.285
	Moderate stress	309	223(72.2%)	86(27.8%)	
	High perceived stress	40	26(65.0%)	14(35.0%)	

## **Discussion:-**

The academic years overlap with the adolescent age, which marks the typical age period for EDs onset because of amplified worries about body image [11]. The academic life and an overdemanding medical education with high workloads lead to pressure and stress. This situation also coincides with many body changes and environmental factors and can interfere with academic performance and affect eating habits and physical activities [13]. Medical students are mainly young and exposed to stress, high hospital workload, and disease experience, making them vulnerable and increasing their risks for EDs [8]. We evaluated the association between EDs and stress among medical students in Tabuk, Saudi Arabia.

We found that participants had an overall mean (SD) EAT score of  $15.28 \pm 13.3$ , indicating a lower risk of EDs, and a mean PSS score of  $20.59 \pm 4.7$ , suggesting perceived stress. The majority of participants were at low risk of EDs and had moderate stress levels (72.1% and 82.8%, respectively). These findings indicate that 27.9% of participants were at high risk of EDs, which is similar to some previous studies. Though the percentage of our study participants at risk of EDs is high when compared to what was reported by a study conducted on Taif University students, Saudi Arabia [11]. However, it is higher than what was found in Karachi, Pakistan, where a study on 435 medical students revealed that 23% were at a high risk of EDs [3]. The medical school curriculum is stressful and time-consuming, evidenced by moderate stress levels among almost three-quarters of our participants. This could expose students to unhealthy eating, increasing the risk for EDs as this a study conducted on Taif University students revealed that medical and obese students were at higher risks [11]. Aligning with our findings, another study showed that more than 77.5% of medical students at two universities in Fallujah and Anbar, Iraq, had different levels of stress, namely severe (30.2%), moderate (25.5%) and mild (21.8%) [12].

Factors such as academic sleep deprivation, higher expectations from family, frequent exams and tests, and extracurriculum duties are reported to be the source of stress among medical students. This could impact students' lifestyles and eating habits, exposing them to more risks of EDs. Supporting this, a study carried out at the Qassim University, Saudi Arabia, found that 56.1% of students with stress took breakfast, lunch and dinner before joining the university, but this number was significantly reduced to 17.3% after university admission while eating habits in non-stressed students didn't change. Stressed students preferred fast foods, snacks and beverages more than nonstressed students, citing sweetness and easy access as the reasons [9].

A study from Egypt found that more than half of medical students had depression, and over two-thirds had anxiety and stress [14]. Another study conducted in Oman revealed the perceived stress in 51% of medical students, EDs in 16.2%, and sleep difficulties in 79.1%. Though our study didn't find any statistically significant correlation between age and academic years of study, this study from Oman reported a correlation between stress and age (p < 0.01),

years of study (p < 0.05), and poor sleeping patterns (p<0.001) [15]. The study from India reported similar findings where age and body shape discontent were associated with EDs among 16.9% of medical students [16]. Since women are more conscious about their body shape and image, studies have found that female students are at higher risk of stress and EDs than male students [3,14]. This is similar to our findings showing that more male participants had low and moderate stress levels than female participants while 2.5 times more female participants had high-stress levels than male participants. A study conducted in Jordan identified with female sex, in addition to urban residence, weight preoccupation as EDs risk factors [17], while media exposure, body shape displeasure, and weight relating bullying were factors reported in Kuwait among university students [10].

Fatima et al. conducted a study in Arar city, Saudi Arabia and found that 25.47% of adolescent girls had EDs, and the prevalence was higher in overweight and obese girls. Vegetarian girls had significantly higher EAT 26 scores, indicating more risk of EDs than non-vegetarian girls. This might be explained by the worry about their body shape, which pushed them to be vegetarian to achieve their desired results [18]. However, our study didn't find any statistically significant difference in EDs risks between male and female genders. Pressure from peers and mass media were reported as risk factors for EDs in Jordanian adolescents, along with female sex, urban residence, and weight preoccupation [17], while media exposure, body shape displeasure, and weight relating bullying were factors reported in Kuwait among university students [10].

We found higher stress levels and risk for EDs among more smokers and participants with medical conditions compared to non-smokers and those without medical conditions. This may be due to extra stress caused by diseases on top of academic duties, which might result in smoking habits to relieve stress. High-stress levels coupled with the psychological and physical impacts of EDs could have also exposed participants to more health conditions. Some health conditions associated with EDs and stress include depression, anxiety disorders, cardiovascular diseases and digestive disorders [4].

A high level of stress negatively impacts academic performance as it was found that students with stress have low resilience, poor social interaction with peers, and low self-efficacy, leading to poor academic performance [19]. Similarly, our study findings showed that students with high-stress levels performed poorly in their studies. However, students with low, and moderate perceived stress levels performed well and excellently. This may be caused by their attention to detail and hard work during their medical studies, causing some stress that is not enough to hinder their performance.

We found the increase in participants with high risks of EDs with the increase in the frequency of physical exercises they perform. This might be explained by the desire to control weight and achieve the desired body shapes among students with EDs, making them add physical exercises to try to lose weight gained from perceived binge eating, reported significantly by more students at high EDs risks. On top of physical exercises, we found that more students at high risk used laxatives, diet pills, or diuretics to control weight and body shapes. These findings align with previous studies that found laxative abuse and severely dieting among patients with EDs and the association between physical exercises and body weight preoccupation [20–22]. In Victoria, Australia, a study reported that adolescent girls on a severe diet had 18 times more risks for EDs, while those on a moderate diet had 5 times more risks than those who did not diet [23]. Though physical exercises are beneficial for the physical and mental health of patients with EDs, they usually engage in unhealthy, extremely high levels of exercise to control weight [24], which could be harmful. Therefore, there is a need for medical students to be guided by professionals to benefit from exercises and other treatment modalities available.

Even if a study from Iran at Tabriz Islamic Azad University found an association between emotional eating EDs, perceived stress and BMI, as well as physical activity and perceived stress [25], our study could not establish statistically significant associations between EDs and BMI, EDs risks and perceived stress levels, or physical activity and perceived stress.

Our study has some limitations to consider. It was conducted in a single university, and the results might not accurately represent all medical students in Saudi Arabia. Generally, there is a stigma associated with eating disorders and the victims tend to deny or hide that they need help. This might result in self-underreporting during our study since our study relied on participants's own responses.

## **Conclusion:-**

This study showed that around a quarter of participants were at high risk of EDs and all scored high on the perceived stress scale, indicating the predominance of stress. We found that high-stress levels were associated with poor academic performance. Participants with medical conditions tended to be at higher risk of EDs than those without medical conditions. High-risk participants tended to perform physical exercises frequently, indicating their need to control weight and shape. High-stress levels were reported by more female participants, more smokers and participants with medical conditions compared to their counterparts with medical conditions, male and non-smokers. However, this study couldn't find any statistically significant correlation between EDs risks and perceived stress levels.

These findings underline the need for awareness and professionally guiding medical students with EDs through their treatment options and establishing measures to relieve stress among students to improve their quality of life and academic performance.

#### Ethical considerations

The study protocol was approved by the Research Committee of the Saudi preventive medicine program and Institutional Review Boards (IRB) of the Tabuk University, Saudi Arabia.

# **References:-**

1. Iyer, S.; Shriraam, V. Prevalence of Eating Disorders and Its Associated Risk Factors in Students of a Medical College Hospital in South India. Cureus2021, 13, e12926, doi:10.7759/cureus.12926.

2. Chan, Y.L.; Samy, A.L.; Tong, W.T.; Islam, M.A.; Low, W.Y. Eating Disorder Among Malaysian University Students and Its Associated Factors. Asia Pac J Public Health2020, 32, 334–339, doi:10.1177/1010539520947879.

3. Memon, A.A.; Adil, S.E.-R.; Siddiqui, E.U.; Naeem, S.S.; Ali, S.A.; Mehmood, K. Eating Disorders in Medical Students of Karachi, Pakistan-a Cross-Sectional Study. BMC Res Notes2012, 5, 84, doi:10.1186/1756-0500-5-84.

4. Al Sabbah, H.; Muhsineh, S. Disordered Eating Attitudes and Exercise Behavior among Female Emirati College Students in the United Arab Emirates: A Cross- Sectional Study. AJNE2017, 1, 62, doi:10.18502/ajne.v1i2.1224.

5. DeBoer, L.B.; Smits, J.A.J. Anxiety and Disordered Eating. Cogn Ther Res2013, 37, 887–889, doi:10.1007/s10608-013-9565-9.

6. Wu, X.Y.; Yin, W.Q.; Sun, H.W.; Yang, S.X.; Li, X.Y.; Liu, H.Q. The Association between Disordered Eating and Health-Related Quality of Life among Children and Adolescents: A Systematic Review of Population-Based Studies. PLoS ONE2019, 14, e0222777, doi:10.1371/journal.pone.0222777.

7. Du, C.; Adjepong, M.; Zan, M.C.H.; Cho, M.J.; Fenton, J.I.; Hsiao, P.Y.; Keaver, L.; Lee, H.; Ludy, M.-J.; Shen, W.; et al. Gender Differences in the Relationships between Perceived Stress, Eating Behaviors, Sleep, Dietary Risk, and Body Mass Index. Nutrients2022, 14, 1045, doi:10.3390/nu14051045.

8. Tsoumbou-Bakana, G.; Slith, H.; Traore, B.; Mchichi Alami, K.; Nani, S. Determinants of Eating Disorders among Morrocan Medical Students. European Journal of Public Health2021, 31, ckab165.432, doi:10.1093/eurpub/ckab165.432.

9. Almogbel, E.; Aladhadh, A.M.; Almotyri, B.H.; Alhumaid, A.F.; Rasheed, N. Stress Associated Alterations in Dietary Behaviours of Undergraduate Students of Qassim University, Saudi Arabia. Open Access Maced J Med Sci2019, 7, 2182–2188, doi:10.3889/oamjms.2019.571.

10. Musaiger, A.; Al-Kandari, F.; Al-Mannai, M.; Al-Faraj, A.; Bouriki, F.; Shehab, F.; Al-Dabous, L.; Al-Qalaf, W. Disordered Eating Attitudes among University Students in Kuwait: The Role of Gender and Obesity. Int J Prev Med2016, 7, 67, doi:10.4103/2008-7802.180413.

11. Abd El-Azeem Taha, A.A.; Abu-Zaid, H.A.; El-Sayed Desouky, D. Eating Disorders Among Female Students of Taif University, Saudi Arabia. Arch Iran Med2018, 21, 111–117.

12. Al Shawi, A.F.; Abdullateef, A.N.; Khedher, M.A.; Rejab, M.S.; Khaleel, R.N. Assessing Stress among Medical Students in Anbar Governorate, Iraq: A Cross-Sectional Study. Pan Afr Med J2018, 31, doi:10.11604/pamj.2018.31.96.16737.

13. Tavolacci, M.-P.; Déchelotte, P.; Ladner, J. Eating Disorders among College Students in France: Characteristics, Help-and Care-Seeking. Int J Environ Res Public Health2020, 17, E5914, doi:10.3390/ijerph17165914. 14. Bedewy, D.; Gabriel, A. Examining Perceptions of Academic Stress and Its Sources among University Students: The Perception of Academic Stress Scale. Health Psychology Open2015, 2, 205510291559671, doi:10.1177/2055102915596714.

15. Al Shamli, S.; Al Omrani, S.; Al-Mahrouqi, T.; Chan, M.; Al Salmi, O.; Al-Saadoon, M.; Ganesh, A.; Al-Adawi, S. Perceived Stress and Its Correlates among Medical Trainees in Oman: A Single-Institution Study. Taiwan J Psychiatry2021, 35, 188, doi:10.4103/TPSY.TPSY\_37\_21.

16. Ramaiah, R. Eating Disorders among Medical Students of a Rural Teaching Hospital: A Cross-Sectional Study. Int J Community Med Public Health2015, 2, 25, doi:10.5455/2394-6040.ijcmph20150206.

17. Al-Kloub, M.I.; Al-Khawaldeh, O.A.; ALBashtawy, M.; Batiha, A.-M.; Al-Haliq, M. Disordered Eating in Jordanian Adolescents: Disordered Eating. Int J Nurs Pract2019, 25, e12694, doi:10.1111/ijn.12694.

18. Fatima, W.; Ahmad, L.M. Prevalence of Disordered Eating Attitudes among Adolescent Girls in Arar City, Kingdom of Saudi Arabia. Health Psych Res2018, 6, doi:10.4081/hpr.2018.7444.

19. Frazier, P.; Gabriel, A.; Merians, A.; Lust, K. Understanding Stress as an Impediment to Academic Performance. Journal of American College Health2019, 67, 562–570, doi:10.1080/07448481.2018.1499649.

20. Gibson, D.; Benabe, J.; Watters, A.; Oakes, J.; Mehler, P.S. Personality Characteristics and Medical Impact of Stimulant Laxative Abuse in Eating Disorder Patients—a Pilot Study. J Eat Disord2021, 9, 146, doi:10.1186/s40337-021-00502-9.

21. Tozzi, F.; Thornton, L.M.; Mitchell, J.; Fichter, M.M.; Klump, K.L.; Lilenfeld, L.R.; Reba, L.; Strober, M.; Kaye, W.H.; Bulik, C.M. Features Associated With Laxative Abuse in Individuals With Eating Disorders. Psychosomatic Medicine2006, 68, 470–477, doi:10.1097/01.psy.0000221359.35034.e7.

22. Melissa, R.; Lama, M.; Laurence, K.; Sylvie, B.; Jeanne, D.; Odile, V.; Nathalie, G. Physical Activity in Eating Disorders: A Systematic Review. Nutrients2020, 12, 183, doi:10.3390/nu12010183.

23. Patton, G.C.; Selzer, R.; Coffey, C.; Carlin, J.B.; Wolfe, R. Onset of Adolescent Eating Disorders: Population Based Cohort Study over 3 Years. BMJ1999, 318, 765–768, doi:10.1136/bmj.318.7186.765.

24. Brunet, J.; Del Duchetto, F.; Wurz, A. Physical Activity Behaviors and Attitudes among Women with an Eating Disorder: A Qualitative Study. J Eat Disord2021, 9, 20, doi:10.1186/s40337-021-00377-w.

25. Aslani, A.; Faraji, A.; Allahverdizadeh, B.; Fathnezhad-Kazemi, A. Prevalence of Obesity and Association between Body Mass Index and Different Aspects of Lifestyle in Medical Sciences Students: A Cross-sectional Study. Nursing Open2021, 8, 372–379, doi:10.1002/nop2.638.