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Research Article

EFFECT OF STRESS ON EATING HABITS AND BODY MASS INDEX**Zainab Ahmed Buhaliqah¹, Kawther Mohammed ALIsmail², Zainab Mohammed Al-Hashmi³,
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Abstract:

Background: There is a strong belief that stress levels can influence the eating habits and may affect weight and Body Mass Index. The association between stress and weight gain is less clear. Stress may lead to changes in dietary habit that lead to weight change with various effects related to sex, body mass index (BMI) in response to stress. **Objectives:** to show the effect of stress on BMI among Saudi population.

Methods: This is a community-based cross-sectional study on a total of 571 random participants of Saudi population were included in this study. The study period was from October 2018 to January 2019. Participants filled the self-reported pre-designed online questionnaire after a brief introduction to explain the aim of the study to them. Data was analyzed using SPSS V.16.0. Chi-square test was used to examine the association between different variables. $P < 0.05$ was considered as statistically significant.

Results: Regarding the level of daily stress, our study reported moderate stress by 47.3% followed by high level 26.4%, low level 15.4% and very high level stress by 10.9%. But regarding the body mass group, our study reported that the majority of participants were obese 40.6% followed by normal weight 31.3% and overweight 26.1%. We found that there was relation between psychic stress and Body Mass Index in 60.9% of cases and this relation was weight gain in 49.9% and weight loss in 20%. As regards reactions to stress 30.6% of cases deal with stress by sleeping, 24.7% by eating and 12.4% by drugs. Regarding the preferred meals our study reported; carbohydrates 52.7%, protein 27%, fat 10.3% and fibers 10%.

Conclusion: in our study, there is an evidence that stress can influence the eating habits and may affect body weight and Body Mass Index.

Key words: stress; eating habits; body weight; Body Mass Index.

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INTRODUCTION:

Stress is the process of adaptation in response to a physical or psychological challenge, and affects well-being through disrupting the equilibrium of physical and psychological systems [1]. It is an indicator of complex mental health, considered as a risk factor for the onset of problems of depression in adolescence, which can, in more severe cases, lead to suicide [2]. Psychosocial stress is a major health concern worldwide and has been associated with numerous serious illnesses, including depression, cardiac disease, diabetes, hypertension, and possibly even cancer [3, 4].

Stress can be related to the pressures of work, family and other daily responsibilities, which might affect many aspects of life (i.e. physical, behavioral and psychiatric manifestations) explained by sustained, excessive secretion and effect of major mediators of stress [5]. Stress causes elevation of stress hormone cortisol. Chronic elevation of this hormone leads to increased visceral adiposity and other metabolic syndrome [6].

Association between stress and weight gain is not very clear. Stress may result in changes in dietary behaviors which lead to weight change [7]. Many factors as sex, BMI or cortisol activity along with dietary behaviors may cause some people to gain more weight under stressful circumstances, while others may lose weight when stressed [8]. The complex interaction of environmental, psychological, nutritional, societal and biological factors is nearly absent in the focus on stress as a cause of obesity.

Stress, induced by negative life events, and depressive symptoms, have been identified as risk factors for short and long term weight gain in prospective studies [9, 10].

The study aim to show the effect of stress on BMI among Saudi population.

METHODOLOGY:

This is a community-based cross-sectional study on a total of 571 random participants of Saudi population were included in this study. The study period was from October 2018 to January 2019. Participants filled the self-reported pre-designed online questionnaire after a brief introduction to explain the aim of the study to them.

A pre-designed questionnaire consisted of information regarding age, sex, working status, marital status, dietary habits, number of meals per-

day, physical exercise, degree of exposure to stress, the main cause of stress and how they deal with stress. Another question asked participants what the main content of their meal is.

The body weight (kg) and height (m) of each participant will be measured according to criteria described by Gibson [12].

The BMI was calculated (body weight in kg/height in m²), and classified BMI below 18.5 kg/m² was classified as underweight, 25–30 as overweight, and above 30 as obese.

Sampling:

The sample size will be calculated using the sample size equation: $n = z^2 p(1-p)/e^2$, considering target population less than 1000, and study power 95%, and the prevalence of obesity 50%. The minimum required sample is 200 students. Systematic random sampling technique was followed by interviewing every 2nd student.

Ethical considerations:

Participants were informed that participation is completely voluntary. No names were recorded on the questionnaires. All questionnaires kept safe.

Statistical treatment:

Descriptive statistics and testing of hypothesis were used for the analysis. The data was analyzed using SPSS V.16.0 (SPSS Inc; Chicago, IL, USA). The Chi-square test was used to examine the association between different variables. $P < 0.05$ was considered as statistically significant.

RESULTS:

Tables of the study revealed that, regarding the level of daily stress, moderate stress by 47.3% followed by high level 26.4%, low level 15.4% and very high level stress by 10.9%. But regarding the body mass group, our study reported that the majority of participants were obese 40.6% followed by normal weight 31.3% and overweight 26.1%. We found that there was relation between psychic stress and Body Mass Index in 60.9% of cases and this relation was weight gain in 49.9% and weight loss in 20%. As regards reactions to stress 30.6% of cases deal with stress by sleeping, 24.7% by eating and 12.4% by drugs. Regarding the preferred meals our study reported; carbohydrates 52.7%, protein 27%, fat 10.3% and fibers 10%.

Table (1): socio-demographic variables among the studied population

Variables	Frequency	Percent
Age group		
• <21	67	11.7
• 21-30	144	25.2
• 31-40	212	37.1
• 41-50	94	16.5
• >50	54	9.5
Sex		
• Female	468	82.0
• Male	103	18.0
Working status		
• Not working	288	50.4
• Employed	283	49.6
Educational level		
• Primary	5	.9
• Secondary	120	21.0
• University or more	415	72.7
• Preparatory	31	5.4
Economic status		
• High	276	48.4
• Middle	274	48.0
• Low	21	3.7
Marital status		
• Widow	12	2.1
• Single	146	25.6
• Married	395	69.2
• Divorced	18	3.2

Table (2): obesity related variables among the studied population

BMI group		
• Underweight	11	1.9
• Normal	179	31.3
• Overweight	149	26.1
• Obese	232	40.6
Number of daily meals		
• One	9	1.6
• Two	175	30.6
• Three	314	55.0
• Four	73	12.8
Takeaway meals		
• No	219	38.4
• Yes	352	61.6
The preferred meals		
• Fibers	57	10.0
• Protein	154	27.0
• Fat	59	10.3
• Carbohydrates	301	52.7
Physical exercise		

• No	377	66.0
• Yes	194	34.0
Diabetes		
• No	528	92.5
• Yes	43	7.5
Hypertension		
• No	508	89.0
• Yes	63	11.0
Atherosclerosis		
• No	562	98.4
• Yes	9	1.6
Other chronic diseases		
• No	477	83.5
• Yes	94	16.5

Table (3): stress related variables among the studied population

Level of daily stress		
• Very high	62	10.9
• High	151	26.4
• Moderate	270	47.3
• Low	88	15.4
Causes of stress		
• The family	156	27.3
• Studying	72	12.6
• Social life	172	30.1
• Work	171	29.9
Reaction to stress		
• Sleeping	175	30.6
• Eating	141	24.7
• Drugs	71	12.4
• Prayer	63	11.0
• Crying and nervousness	40	8.0
• Smoking	34	6.0
• Watching TV	27	4.7
• Walking and physical exercise	20	4.0
The relation between psychic stress and Body Mass Index		
• No	172	30.1
• Yes	348	60.9
The relation was		
▪ وزن زيادة	285	49.9
▪ وزن نقص	114	20.0

Table (4): relationship between level of daily stress and sex, no. of daily meals, bmi, causes of daily stress and working status among the studied population

Variables	Responses	Level of daily stress				Total (n=571)	P value
		Moderate (n=270)	High (n=151)	Very high (n=62)	Low (n=88)		
Sex	Female	217	127	54	70	468	0.496
		80.4%	84.1%	87.1%	79.5%	82.0%	
	Male	53	24	8	18	103	
		19.6%	15.9%	12.9%	20.5%	18.0%	
No. of daily meals	One	3	3	1	2	9	0.784
		1.1%	2.0%	1.6%	2.3%	1.6%	
	Two	73	53	20	29	175	
		27.0%	35.1%	32.3%	33.0%	30.6%	
	Three	155	76	35	48	314	
		57.4%	50.3%	56.5%	54.5%	55.0%	
	Four	39	19	6	9	73	
		14.4%	12.6%	9.7%	10.2%	12.8%	
BMI group	Underweight	6	2	1	2	11	0.814
		2.2%	1.3%	1.6%	2.3%	1.9%	
	Normal	81	47	21	30	179	
		30.0%	31.1%	33.9%	34.1%	31.3%	
	Overweight	72	36	13	28	149	
		26.7%	23.8%	21.0%	31.8%	26.1%	
	Obese	111	66	27	28	232	
		41.1%	43.7%	43.5%	31.8%	40.6%	
Causes of daily stress	Family	71	37	24	24	156	0.001
		26.3%	24.5%	38.7%	27.3%	27.3%	
	Studying	32	14	9	17	72	
		11.9%	9.3%	14.5%	19.3%	12.6%	
	Social	93	35	11	33	172	
		34.4%	23.2%	17.7%	37.5%	30.1%	
	Work	74	65	18	14	171	
		27.4%	43.0%	29.0%	15.9%	29.9%	
Working status	Not working	137	67	28	56	288	0.021
		50.7%	44.4%	45.2%	63.6%	50.4%	
	Working	133	84	34	32	283	
		49.3%	55.6%	54.8%	36.4%	49.6%	

DISCUSSION:

A definition of stress is anything that can disturb the normal individual's mental or physical wellbeing [11]. There is a strong belief that stress levels can influence the eating habits and may affect weight and Body Mass Index. The association between stress and weight gain is less clear. Stress may lead to changes in dietary habit that lead to weight change with various effects related to sex [12], body mass index (BMI) [13] in response to stress [14]. These factors may cause some people to gain more weight under stressful circumstances while others may gain less weight or even lose weight when

stressed. Few studies have examined the contribution of stress to body weight, and the role of race/ethnicity in the stress-body weight connection. In a national sample, men and women reporting a greater number of stressful days in the past 30 days had a higher body mass index (BMI) [15].

This is across sectional study was conducted among 571 of studied population, KSA. The study aim to show the effect of stress on BMI among Saudi population.

Regarding to level of daily stress our study reported

moderate stress by 47.3% followed by high level 26.4%, low level 15.4% and very high level stress by 10.9%. We found that there was relation between psychic stress and Body Mass Index in 60.9% of cases and this relation was weight gain in 49.9% and weight loss in 20%. A Cross-sectional was conducted among 217 overweight women found that perceived stress scores were significantly correlated with weight change such that higher perceived stress was associated with a positive weight change gain [16]. Another study was conducted among 4,065 adolescents aged from 11 to 16 across 5-year period reported; higher stress by 32.6%, moderate 33% and lower stress by 34% and it found that higher stress over the whole period was associated with greater gains in BMI, BMI were significantly higher in the moderate- and higher-stress groups than the lower-stress group across the whole 5-year period [17]. A nationally representative cohort of US adults followed longitudinally over 9 years found that psychosocial stress was associated with greater weight gain among both men and women with higher baseline body mass indexes [18]. A prospective study conducted among British civil servants suggests that work stress, as indicated by job strain and low job control, increases the likelihood of weight gain among men with a higher BMI, but seems to predict weight loss among lean men who have no need for weight reduction [19]. In Bangladesh, another study conducted among 278 adolescent students; majority (86%) of the respondents were highly stressed and the rest were moderately stressed, none in the study scored to be in low stress category, in the sample, after controlling for other factors, school/leisure conflict related stress seemed to have positive influence on the body mass index of the participants and result also showed that respondents who had experienced stress due to school/leisure conflict had 4 times higher risk of gaining weight and becoming overweight and obese [20]. In India another study conducted among 150 patricians found that majority at 52% perceived 'moderate' stress, 27.3% mild and 20.7% high, significant correlation and positive linear relationship found between perceived Stress and BMI which meaning that increased Perceived Stress has an effect on Body Mass Index [21]. However, in US another study reported; 28.1% of cases had low stress level, 26.3% moderate, 21.9% high and 23.8% very high, the study found that there were no significant differences found between stress and categorical body mass index scores ($p = 0.539$), nor between BMI and eating out frequency ($p = 0.672$) [22].

As regards reactions to stress 30.6% of cases deal with stress by sleeping, 24.7% by eating and 12.4%

by drugs. Some studies show decreases in food intake under acute stress, acute stress can also increase intake, especially when calorie-dense foods are available [23, 24]. For example, another study reported that 42% of cases reported increase food intake with perceived stress, and 73% of the participants reported increase in snacking during stress [25]. There is significant evidence suggesting potentially detrimental effects of stress on eating patterns (e.g., skipping meals, restraining intake, binging) and food preference [26]. Stress can increase consumption of fast food [27], snacks [28], calorie-dense and highly-palatable foods [29], and stress has been associated with increased binge eating [30].

Regarding the body mass group our study reported that the majority of participants were obese 40.6% followed by normal weight 31.3% and overweight 26.1%. In contrast to our results another study reported that the overall prevalence of obesity is 7.3%, the majority were normal weight 62 %, prevalence of overweight was 26.7% and prevalence of underweight was 4% [21]. In Egypt Another study found that 41.3% of the cases were of normal weight while 9.5% of the sample were underweight, 36.9% were overweight and 12.5% were obese, obese individuals eat more during feeling of stress compared to non-obese and the difference was statistically significant [31].

Regarding to preferred meals our study reported; carbohydrates 52.7%, protein 27%, fat 10.3% and fibers 10%. Dalman et al. [32] demonstrated that eating high fat and carbohydrate caloric content 'comfort' food may help in reducing biological stress system activity and concomitant negative emotions during chronic stress. The tendency to eat such energy-dense foods under stress is likely to contribute to weight gain [33, 34].

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