Medical Science

25(110), April, 2021

Eating disorders amongst adolescents in Makkah: Effects of stress and smoking

Khloud J Ghafouri[1]✉, **Alaa H Qadhi**[1], **Mazen M Ghaith**[2], **Wedad F Azhar**[1], **Firas S Azzeh**[1], **Mahmoud M Habibullah**[3,4]

To Cite:
Ghafouri KJ, Qadhi AH, Ghaith MM, Azhar WF, Azzeh FS, Habibullah MM. Eating disorders amongst adolescents in Makkah: Effects of stress and smoking. *Medical Science*, 2021, 25(110), 767-775

Author Affiliation:
[1]Clinical Nutrition Department, Faculty of Applied Medical Sciences, Umm Al-Qura University, Al-Abdeyah, PO Box 7607, Makkah, Saudi Arabia
[2]Laboratory Medicine Department, Faculty of Applied Medical Sciences, Umm Al-Qura University, Al-Abdeyah, PO Box 7607, Makkah, Saudi Arabia
[3]Medical Laboratory Technology department, Faculty of Applied Medical Sciences, Jazan University, Saudi Arabia
[4]Medical Research Centre, Jazan University, Jazan 45142, Saudi Arabia

✉**Corresponding author**
Assistant professor at Clinical Nutrition Department, Faculty of Applied Medical sciences, University of Umm Al-Qura, Makkah, Kingdom of Saudi Arabia;
Email: Kjghagouri@uqu.edu.sa

Peer-Review History
Received: 13 February 2021
Reviewed & Revised: 14/February/2021 to 21/March/2021
Accepted: 22 March 2021
Published: April 2021

Peer-review Method
External peer-review was done through double-blind method.

ABSTRACT

Background: Eating disorders (ED) are a common health problem amongst adolescents. The high incidence may reflect ignorance, but it may also be influenced by environmental factors. This study aimed to investigate the potential students at risk of ED amongst high school students in Makkah, and to evaluate the relationship between risk of ED and smoking or perceived stress. *Method*: 471 students (72 males and 399 females) from private and public secondary schools were enrolled in the study. Demographic data and Perceived Stress Scale questionnaires were used to determine the potential prevalence of students with the risk of ED. *Results*: Results classified 46% students into the group at risk for anorexia or bulimia nervosa. 29% students were identified as having possible issues with food or body image. A significant relationship was found between stress levels and the risk for ED ($p<0.05$). Additionally, there was a significant relationship between smoking and the likely risk of ED. Girls exhibited a higher prevalence of stress compared to male subjects ($p<0.05$). Significant relationships were identified between obesity and risk of ED in both genders ($p<0.05$), also between gender and weight ($p<0.05$). *Conclusion*: Students in Makkah are at risk of ED. Data suggesting that high stress levels and smoking have a significant influence on ED development.

Keywords: Anorexia; Bulimia; eating disorders; Stress.

1. INTRODUCTION

Eating disorders (ED) are psychological disorders. They form the third most common group of pathological diagnoses amongst adolescents worldwide after obesity and asthma (Fisher et al., 1995; Cohrdes et al., 2019). The prevalence of reported ED in adolescents and young adults is approximately 3% (Golden et al., 2016; Sim et al., 2017). They occur more frequently in women; it is estimated that 1-4% of females have anorexia nervosa (Rosen, 2010; Le Grange et al., 2012). The range of ED is categorized as: anorexia nervosa (AN), binge eating disorder (BED), bulimia nervosa (BN), other specified feeding eating disorder (OSFED), avoidant-restrictive food intake disorder, and eating disorder not otherwise specified (EDNOS) (Call et al.,

2013). ED can afflict any age, sex, race, or ethnicity. However, the most frequent age of onset for both AN and BN is during teenage years (Levenson, 2011). In contrast, BED most commonly presents during the patient's mid–twenties (Hudson et al., 2007). ED affects physiological and nutritional status (Bulik et al., 2005; Association, 2013). The death rate caused by AN is relatively high amongst women and girls when compared with other mental disorders (Núñez-Navarro et al., 2012; Dobrescu et al., 2020).

Anorexia Nervosa is the most prevalent type of ED and can be defined as a psychiatric disorder with profound biological, psychological and social consequences. Patients with AN restrict their food intake so severely that they may cause serious personal harm (Call et al., 2013). At the other end of the spectrum, BN is an ED characterized by recurrent bouts of binge eating. During an episode, there is loss of control and marked overeating, followed by purging behaviour using laxatives and / or diuretics. Excessive exercise may also be performed in an attempt to burn off excess calorie intake (Bulik et al., 2005; Call et al., 2013). Binge eating *per se* is defined as overeating without purging. Over time, repeated episodes may cause obesity, which may in turn give rise to chronic health conditions such as type 2 diabetes and heart disease (Herpertz-Dahlmann, 2009). Symptoms common to all ED include anxiety, personality disorders, psycho neuroticisms, lack of control, self-injurious behaviour, frequently eating alone or in secret, feeling depressed, disgusted, ashamed, guilty and upset (Kuipers et al., 2016).

Eating disorders can be life-threatening; AN has a significantly greater mortality rate than both BN and BED, and the highest mortality rate of any psychiatric disorder (Fichter & Quadflieg, 2016). ED are associated with poor mental health, of which anxiety disorders are the most common (Rojo-Moreno et al., 2015). Numerous concomitant medical comorbidities also occur. In AN there is often a critical loss of body mass index (BMI) and changes in menstrual function (Sim et al., 2017). Bone formation is usually impaired with a consequent reduction in bone strength; 85% of women with a diagnosis of AN have either osteoporosis or osteopenia. Bone marrow function may also be depressed, typically giving rise to anaemia, leucopaenia and thrombocytopaenia (Steinman & Shibli-Rahhal, 2019).

Psychological, social and biological factors may contribute to the development of ED (Treasure et al., 2008; Avena & Bocarsly, 2012). In particular, it has been reported that varying forms of media may influence ED presentation in vulnerable age groups. Exposure to social media may contribute to the development of at-risk behaviours for ED onset (Uchôa et al., 2019). Mass media, including print media and increasingly, mobile media, promote ideas regarding beauty issues, body image and weight surveillance through widespread dissemination of photographs and messages(Garcia-Campayo et al., 2005; Stokes et al., 2016). Focusing on a certain body shape might has a negative effect on girls and women, frequently influencing their view of themselves and their own worth (Monro & Huon, 2005). Although normal body image lies on a continuum, societal pressure to achieve supposed perfection may precipitate emotions of distress (Rodgers et al., 2019). It has therefore been suggested that exposure to this material may increase the likelihood of individuals engaging in extreme weight control behaviours with subsequent ED development.

Although BED may develop in childhood, especially in overweight and obese individuals, a significant proportion of teenagers and young adults report symptoms suggestive of BED (Tanofsky-Kraff et al., 2020). However, adults with BED frequently report that their symptoms began earlier in life, and were associated with body weight and shape issues, suggesting that a developmental perspective of binge eating may be justified. Loss of control in relation to eating in childhood may increase the risk of persistent behaviours that may subsequently develop into BED and adult obesity (McLean & Paxton, 2019; Rodgers et al., 2019; Tanofsky-Kraff et al., 2020). It is therefore important to detect ED in early life and to understand the factors that play a major role in their development in order to reduce the incidence of adult complications.

The aims of this study were: (i) to measure the prevalence of ED amongst adolescent in Makkah, and (ii) to identify factors that might influence the development of ED.

2. METHODOLOGY

Study design and setting

A descriptive, observational, cross-sectional study was carried out in high school students in Makkah, Saudi Arabia. The sample size was calculated from the total number of the students in public and private secondary schools.

Participants

471 apparently healthy high school students (399 girls; 72 boys) were recruited randomly for this study. The female students were recruited from 8 schools (3 private and 5 public) and the male students were recruited from 4 schools (2 private and 2 public) in Makkah during 2019. Exclusion criteria were students who were pregnant or lactating, or who had a chronic illness, e.g. diabetes mellitus or cardiovascular disease.

Study Protocol

Weight and height were recorded. BMI, defined as the body mass divided by height squared, was calculated, expressed in units of kg/m^2 and analyzed by gender. The BMI results were subdivided into the following categories: accentuated thinness (BMI 16.0–16.99 kg/m^2), thinness (BMI 17.00–18.49 kg/m^2), normal (BMI 18.5–24.9 kg/m2), overweight (BMI 25.0–29.9 kg/m^2), obese I (BMI ≥30.0 kg/m^2), obese II (BMI ≥35.0 kg/m^2) and obese III (BMI ≥40.0 kg/m^2).

Participants were interviewed to fill in a questionnaire composed of three sections: (i) personal information (demographic data), (ii) the Arabic version of SCOFF, a validated tool to screen for ED (Leung et al., 2009; Garcia et al., 2010; Sánchez-Armass et al., 2012; Aoun et al., 2015). The scoring of SCOFF was as follows: one point for every "yes" answer and 0 for every "no" answer. A total score of ≥ 2 indicates that the participant has a high possibility of having anorexia nervosa or bulimia nervosa and (iii) Perceived Stress Scale (PSS) to evaluate each student's self-perception of their stress levels (Leung et al., 2009; Garcia et al., 2010; Sánchez-Armass et al., 2012; Aoun et al., 2015). It contains 14 items or questionnaires. Each item was rated on a five-point scale from 0 = 'never' to 4 = 'very often', covering the previous month. The PSS scores are obtained by reversing the responses (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1 and 4 = 0) to the four positively stated items (items 4, 5, 7, and 8) and then summing across all the scale items. The scores ranged from 0 to 56, with higher scores indicating higher levels of perceived stress and the lower scores indicating lower levels of stress (Rauof et al., 2015).

The questionnaires were translated from English to Arabic by two independent translators and then back-translated by a further independent translator. Finally, the data were processed through face validation.

Data Analysis

471 students participated in the study. Recruitment was increased by 21% from the originally anticipated 374 (based on 16% expected prevalence, 5% margins of error, and 95% confidence level) (Al-Subaie, 2000). All collected data were verified manually and then coded prior to computer entry. Data analysis was performed using the Statistical Package of the Social Sciences (SPSS) program, version 20. A Chi-square test was used to establish any association between categorical variables. When small cell size (expected values <5) was identified, a Fisher's exact test was performed. A p value <0.05 was regarded as statistically significant.

3. RESULTS

According to the calculated BMI, 254 students were of normal weight, 116 underweight, 64 overweight and 36 obese. Among the obese students, 22 of them were obese I, 5 obese class II and 9 obese class III, demographic data of 471 participants are presented in Table 1. The SCOFF scores for the participants were as the following; 119 students scored 0, 136 scored 1, 108 scored 2, 77 scored 3, 27 scored 4, and only 4 scored 5.Moreover the distribution of students based on SCOFF score, 136 (46%) of the students scored 2 or more, indicating that they may have AN or BN. 216 (29%) were identified as having potential issues with food or body image; the remaining 119 (25%) were normal.

Table1 Participants' general information

Categories	Mean ± SD n=471
Age (years)	17.28 ± 1.27
Weight (kg)	13.7 ± 53.75
Hight (cm)	157.63 ± 8.7
BMI (kg/m^2)	8.20 ± 21.97
Family members	2.48 ± 7.25

Figure 1 illustrates the number of smokers in the population in relation to the SCOFF category. 1.7% students identified as normal smoked, 2% students who might have an issue with body image smoked, whereas 6.2% of participants categorised as having potential ED had a nicotine habit. There was a significant relationship between smoking and the likely development of ED: $X2$ (2, N = 471) = 6, p<0.05.

The results of the PSS questionnaire revealed that approximately 355 of the students exhibited high perceived levels of stress. 111 and 5 displayed moderate and low stress factors, respectively. Girls showed a significantly high prevalence of stress compared with boys (p<0.05). Amongst 357 females attending public schools, 237 of them reported high perceived stress levels compared with 35 out of 42 of those from private schools. In boys, 31 out of 45 attended public schools recorded high perceived stress. Whereas 16

out of 26 from private schools reported high perceived stress. However, there was no significant correlation between school type and stress level (Figure 2).

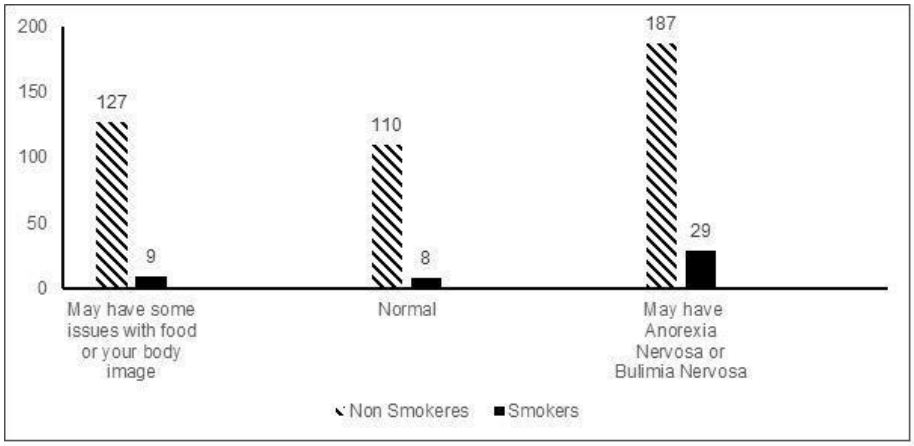

Figure 1 Number of smokers in the population in relation to the SCOFF category

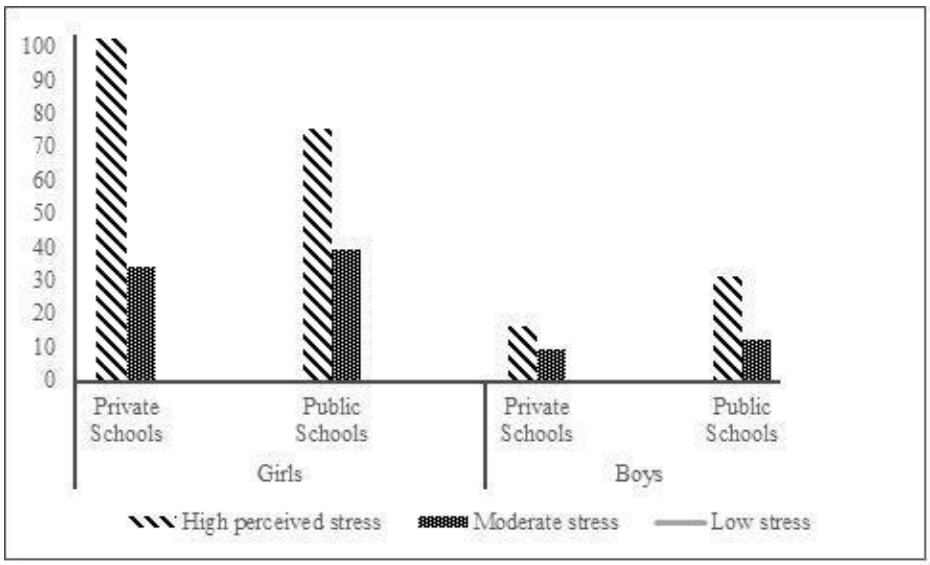

Figure 2 Percentages of stress level regarding school type and gender

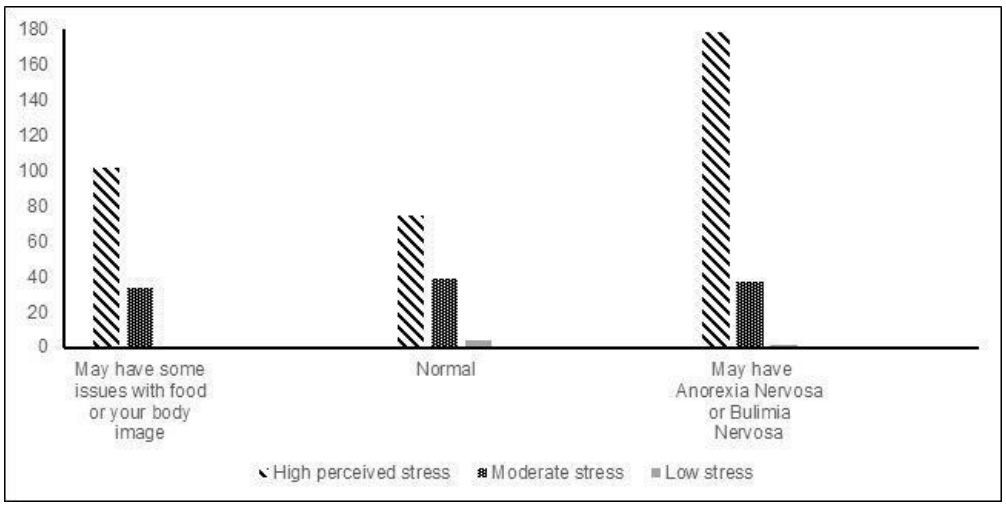

Figure 3 Distribution of stress level perceptions according to SCOFF category

Figure 3 demonstrates the distribution of stress level perceptions according to SCOFF category. 38% students with high perceived stress levels fall into the category of potentially having ED; this relationship was significant; X^2 (4, N = 470) = 19, p <0.05.

When assessed according to their BMI category, the percentage of students who were classified as potentially having ED was 24% in normal weight, 64% in obese class I, 100% in obese class II, 78% in obese class III, and 66% and 28% in overweight and underweight groups respectively (Table 2). There was a significant relationship between obesity and ED likelihood. X^2 (2, N = 368) = 18, p<0.05. Gender has a significant influence on possible ED, with girls having a higher prevalence in this SCOFF category than boys: X^2 (1, N = 84) = 6.6, p<0.05. Amongst girls the prevalence of potential ED was 182 (45%) and 116 (29%) of females potentially had an issue with their body image. Gender also has a significant influence in body weight. The number of underweight females was 71 comparing to 4 boys X^2 (1, N = 471) = 6.6, p<0.05.

Table 2 Distribution of BMI in SCOFF score among participants

BMI category	Criteria			
	May got some issues with food or your body image	Normal	You may have Anorexia Nervosa or Bulimia Nervosa	Total
Normal	73	65	116	254
Obese I	4	4	14	22
Obese II	0	0	5	5
Obese III	0	2	7	9
Overweight	14	8	42	64
Underweight	45	40	32	117
Total	136	118	216	471

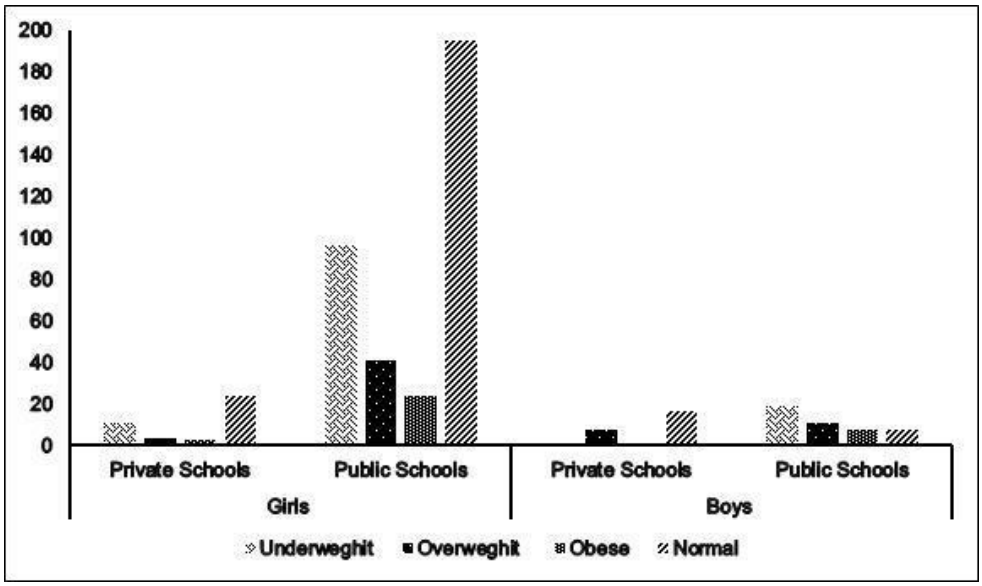

Figure 4 Body weight distribution regarding school type and gender

Type of school was linked to body weight in both genders. 11 girls in private schools and 97 in public schools were underweight. The number of overweight girls in public schools was 41 whereas in private schools was only 4. Obesity was higher in public schools 24, compared with 3 in private schools. Among boys, public schools were having higher obese students 8 compared with 1 in private schools. Same with overweight students, public schools had 11 students who are overweight compared withh8 in private schools. None of the boys in private schools were underweight compared to 19 in public schools. Obese students were 8 in public schools and only 1 in private schools (Figure 4).

Equivalent proportions of female students were identified as having potential ED in private (48%) and public (46%) schools, respectively: X^2 (2, N = 391) = 0.36, p <0.05. However, no correlation between school type and possible ED was seen in boys.

4. DISCUSSION

The primary objective of this study was to evaluate the relationship between stress, smoking and ED behaviours amongst adolescents in Makkah, Saudi Arabia. The current findings according to SCOFF illustrate that the prevalence of potential ED in this population was approximately 46%; an additional 29% had food or body image issues. The high numbers of students might be due to 12.5%'false positive' rate, that has been reported previously (Morgan et al., 2000). ED have been identified in societies worldwide. A study, performed in Argentina in 1,971 children aged between 10 and 19 years, found a total incidence of ED of 6.95%: 6.6% BED, 0.05% BN, and 0.3% EDNOS (Herscovici et al., 2005). In South India, the prevalence of ED amongst students was estimated to be approximately 26% (Nivedita et al., 2018).

A further study from northwest Iran identified 2.5% of 1,990 adolescents as having ED (Rauof et al., 2015). In Turkey, 68/2907 (2.3%) teenage students met the diagnostic criteria for ED (Vardar & Erzengın, 2011). In this series, prevalence rates for ED were as follows: AN: 0.034%; BN: 0.79%: EDNOS: 1.51%; BED: 0.99%; any ED: 2.33% (Vardar & Erzengın, 2011). No male participants were diagnosed with AN or BN; however 8 were diagnosed with BED (Vardar & Erzengın, 2011). A review of 314 adolescent females aged between 15-19 years, performed in Arar City, Saudi Arabia, demonstrated that 25.47% had ED. Additionally, this study illustrated that twice as many female high school students experienced ED compared with their male counterparts; obese adolescents of both genders were three times more likely to be affected than non-obese students. These findings suggest that teenage girls in Saudi are at risk of developing ED (Fatima & Ahmad, 2018). At Imam Abdulrahman Bin Faisal University, Dammam City, a study detected the prevalence of ED in both genders of students during adolescence and young adulthood. However, ED rates were higher in young and adult females. 29.4% of preparatory-year Saudi female students studying at this institution were classified as being at risk for ED (Alwosaifer et al., 2018).

Furthermore, at Taif University, research that investigated the prevalence of ED amongst females using the EAT-26 questionnaire, demonstrated a high prevalence of ED amongst these students. Using the cutoff score of 20 on the EAT-26 test, 35.4% of the students were classified as being at risk for ED (Hasan et al., 2018).

In the current study, findings emphasized that girls were more susceptible to potential ED. They also perceived higher stress levels than boys. One explanation could be the more extreme influence of social media on girls. In addition, females are more likely to be involved in social relations and may be more easily agitated by exam stress, triggering abnormal eating behaviours. Lack of knowledge about ED may make it difficult for students to recognize the warning signs. A study in the United Arab Emirates demonstrated that female students were significantly more influenced by the media than males (Hasan et al., 2018).

Research at Imam Abdulrahman Bin Faisal University, Saudi Arabia, postulated that the media is a platform for the transmission of ideas, values, norms, attitudes and behaviours that construct social reality in relation to females (Alwosaifer et al., 2018). Peers were also a source of external pressure on Saudi University female students to lose weight (Alwosaifer et al., 2018). These influences may reflect a cultural attitude and belief which potentially forces young women to become more sensitive to and more affected by comments from others regarding body image (Alwosaifer et al., 2018). Thus sociocultural context might influence the level of importance placed on social judgments which, in the context of ED, can translate into the acceptance of certain eating behaviours(Alwosaifer et al., 2018).

Another study in Xuzhou, China, showed that there was a positive relationship between life stress and eating behaviours in high school students. They proved that gender, BMI, parental education and family income were associated with higher risk of unhealthy eating behaviours (Napolitano et al., 2019). A series from Italy assessed the knowledge, attitudes, and behaviours toward ED amongst 420 females aged between 14 and 20 years. They reported that in overweight or obese individuals, only 22.8% of those who had at least one parent with a college degree or higher level of education were likely to have accurate knowledge regarding ED, and were familiar with the definitions of AN and BN. More than one third (38.8%) who were unfamiliar with the concepts of AN and BN, avoided eating when they were hungry, were often engaged in dieting behaviour, and were more likely to have a fear of getting fat (Napolitano et al., 2019).

Stress seems to be a very strong factor that influences ED and eating choices. It has been noticed that acute stress increases non-homeostatic eating, i.e. eating in the absence of hunger, in normal and overweight individuals (Rutters et al., 2009). Acute stress causes elevated cortisol levels. The higher the stress level, the higher the cortisol level; the hormone promotes selection and intake of large amounts of unhealthy food (Born et al., 2010). Research to explore the possible effect of academic examination stress on disordered eating attitudes, emotional eating, restraint eating, body image, anxiety levels and self-esteem in a group of female

university students showed that significantly higher levels of disordered eating attitudes (EAT-26, p=0.01) occurred during this time. Socially acknowledged beliefs regarding slenderness and low body weight are evident worldwide. It is therefore likely that a mixture of variables contributes to their development, e.g. subjects demonstrated higher levels of anxiety (p=0.001) and lower levels of self-esteem (p=0.016) over an examination period compared to during a control period. Disordered eating attitudes (EAT-26) were positively correlated with emotional eating (p=0.04) and restrained eating (p=0.010), and negatively correlated with levels of self-esteem (p=0.05) and perceived desired body image (p=0.008) for the duration of the examinations. Finally, EAT-26 was significantly positively correlated with levels of anxiety in both study periods (Costarelli & Patsai, 2012).

With respect to smoking and ED this study shows that smokers are more likely to fall into the group at risk of ED. Anzengruber et al., (2006) reported the prevalence of smoking and features of smoking behaviours in individuals with ED. Women with ED reported higher rates of smoking and greater nicotine dependence than controls. Women with binge / purge subtypes of ED reported the highest rates of smoking of all of the subtypes. A study of 100 in-patients with ED reported that major depression and anxiety are associated with nicotine dependence, especially amongst women. Their results showed that smoking individuals were reliably identified following an ED diagnosis (Haug et al., 2001). A study of 306 women, with an average age of 20.58 years, compared the frequency of cigarette use to ED behaviours. Women with a higher level of symptoms of ED showed greater frequency of cigarette smoking; furthermore, the results indicated a continuous relationship between ED severity and the intensity of cigarette use (Granner et al., 2002).

This is the first study conducted in Makkah to investigate the relationship between stress and ED behaviours. In the current study, the Arabic SCOFF score has been used. The SCOFF questionnaire is a valid tool to detect individuals who merit further investigation with respect to ED risk; it has been validated in several countries including Saudi Arabia, Spain, China, Mexico and France (Leung et al., 2009; Garcia et al., 2010; Sánchez-Armass et al., 2012;Aoun et al., 2015).

The major limitation of this study is its cross-sectional nature. It is therefore impossible to determine causality or temporal sequence. Additionally, dietary intake was not measured. Assessment of food consumed would confirm the subjects' total energy intake; this could have been linked to BMI and subsequently used as part of the ED diagnostic process. Neither physical activity nor the degrees of social media exposure were recorded. Further research should be carried out to measure the effects of social media, social relations and family income on these issues. In addition, it would be recommended that the sample size should contain equal numbers of male and female students.

5. CONCLUSION

Stress and smoking increase the risk of developing ED. Frequent assessments for perceived stressors amongst teenagers should be conducted. In addition, mindfulness courses and stress management should be included in the high school curriculum. Students, in particular girls, should be taught the principles of healthy eating, appropriate body conceptualization, and how to achieve an optimal body weight. Families should be well educated about ED and the importance of early diagnosis. Adolescents should be advised regarding the risks of smoking.

Acknowledgment

We thank the participants who were all contributed samples to the study, who are: Arwa alamoudi, Asrar Alsulaimani, Tala Binyousef, Lina Faghya, Hanin Aljifri, Awatef Althubian, Huda Alrufaidy, Sanaa Milibari, Sondos Alsuwat, and Sabrin Nadir Qari.

Author Contributions

KJG conceived and designed the study. FSA, AHQ, MMG, WFA, HAA, and MMH conducted research, provided research materials, and collected and organized data. FSA, MMG and KJG analyzed and interpreted data. All authors wrote initial and final draft of the article. All authors have critically reviewed and approved the final draft of the manuscript.

Funding

This study has not received any external funding.

Competing interests

The authors declare that they have no competing interests.

Informed consent

Written and Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

Ethical approval

The study was approved by the Medical Ethics Committee of Umm Al-Qura University (ethical approval code: HAPO-02-K-012-2020-05-387).

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Al-Subaie AS. Some correlates of dieting behavior in Saudi schoolgirls. Int J Eat Disord 2000; 28(2):242-246.
2. Alwosaifer AM, Alawadh SA, Wahab MMA, Boubshait LA, Almutairi BA. Eating disorders and associated risk factors among Imam Abdulrahman bin Faisal university preparatory year female students in Kingdom of Saudi Arabia. Saudi Med J 2018; 39(9):910.
3. Anzengruber D, Klump KL, Thornton L, Brandt H, Crawford S, Fichter MM, Halmi KA, Johnson C, Kaplan AS, LaVia M. Smoking in eating disorders. Eat Behav 2006; 7(4):291-299.
4. Aoun A, Azzam J, El Jabbour F, Hlais S, Daham D, El Amm C, Honein K, Dechelotte P. Validation of the Arabic version of the SCOFF questionnaire for the screening of eating disorders. East Mediterr Health J 2015; 21(5):326-331.
5. Avena NM, Bocarsly ME. Dysregulation of brain reward systems in eating disorders: neurochemical information from animal models of binge eating, bulimia nervosa, and anorexia nervosa. Neuropharmacology 2012; 63(1):87-96.
6. Born JM, Lemmens SG, Rutters F, Nieuwenhuizen AG, Formisano E, Goebel R, Westerterp-Plantenga S. Acute stress and food-related reward activation in the brain during food choice during eating in the absence of hunger. Int J Obes 2010; 34(1):172-181.
7. Bulik CM, Reba L, Siega-Riz AM, Reichborn-Kjennerud T. Anorexia nervosa: definition, epidemiology, and cycle of risk. Int J Eat Disord 2005; 37:S2-S9.
8. Call C, Walsh BT, Attia E. From DSM-IV to DSM-5: changes to eating disorder diagnoses. CuCurr Opin Psychiatry 2013; 26(6):532-536.
9. Cohrdes C, Göbel K, Schlack R, Hölling H. Essstörungssymptome bei Kindern und Jugendlichen: Häufigkeiten und Risikofaktoren. Bundesgesundheitsblatt-Gesundheitsforschung-Gesundheitsschutz 2019; 62(10):1195-1204.
10. Costarelli V, Patsai A. Academic examination stress increases disordered eating symptomatology in female university students. Eat Weight Disord 2012; 17(3):e164-e169.
11. Dobrescu SR, Dinkler L, Gillberg C, Råstam M, Gillberg C, Wentz E. Anorexia nervosa: 30-year outcome. Br J Psychiatry 2020; 216(2):97-104.
12. Fatima W, Ahmad LM. Prevalence of disordered eating attitudes among adolescent girls in Arar City, Kingdom of Saudi Arabia. Health Psychol Res 2018; 6:30-35.
13. Fichter MM, Quadflieg N. Mortality in eating disorders-results of a large prospective clinical longitudinal study. Int J Eat Disord 2016; 49(4):391-401.
14. Fisher M, Golden NH, Katzman DK, Kreipe RE, Rees J, Schebendach J, Sigman G, Ammerman S, Hoberman HM. Eating disorders in adolescents: a background paper. J Adolesc Health 1995; 16(6):420-437.
15. Garcia FD, Grigioni S, Chelali S, Meyrignac G, Thibaut F, Dechelotte P.Validation of the French version of SCOFF questionnaire for screening of eating disorders among adults. World J Biol Psychiatry 2010; 11(7):888-893.
16. Garcia-Campayo J, Sanz-Carrillo C, Ibañez J, Lou S, Solano V, Alda M. Validation of the Spanish version of the SCOFF questionnaire for the screening of eating disorders in primary care. J Psychosom Res 2005; 59(2):51-55.
17. Golden NH, Schneider M, Wood C. Preventing obesity and eating disorders in adolescents. Pediatrics 2016; 138(3):e20161649.
18. Granner ML, Black DR, Abood DA. Levels of cigarette and alcohol use related to eating-disorder attitudes. Am J Health Behav 2002; 26(1)2002:43-55.
19. Hasan HA, Najm L, Zaurub S, Jami F, Javadi F, Deeb LA, Iskandarani A, Radwan H. Eating disorders and body image concerns as influenced by family and media among university students in Sharjah, UAE. Asia Pac J Clin Nutr 2018; 27(3):695.
20. Haug NA, Heinberg L, Guarda AS. Cigarette smoking and its relationship to other substance use among eating disordered inpatients. Eat Weight Disord 2001; 6(3):130-139.

21. Herpertz-Dahlmann B.Adolescent eating disorders: definitions, symptomatology, epidemiology and comorbidity. Child Adolesc Psychiatr Clin N Am 2009; 18(1):31-47.
22. HerscoviciCR, Bay L, Kovalskys I. Prevalence of eating disorders in Argentine boys and girls, aged 10 to 19, who are in primary care. A two-stage community-based survey. Eat Disord 2005; 13(5):467-478.
23. Hudson JI, Hiripi E, Pope Jr HG, Kessler RC. The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. Biol psychiatry 2007; 61(3):348-358.
24. Kuipers GS, van Loenhout Z, van der Ark LA, Bekker MH. Attachment insecurity, mentalization and their relation to symptoms in eating disorder patients. Attach Hum Dev 2016; 18(3):250-272.
25. Le Grange D, Swanson SA, Crow SJ, Merikangas KR. Eating disorder not otherwise specified presentation in the US population. Int J Eat Disord 2012; 45(5):711-718.
26. Leung SF, Lee KL, Lee SM, Leung SC, Hung WS, Lee WL, Leung YY, Li MW, Tse TK, Wong HK. Psychometric properties of the SCOFF questionnaire (Chinese version) for screening eating disorders in Hong Kong secondary school students: A cross-sectional study. Int J Nurs Stud 2009; 46(2):239-247.
27. Levenson JL. The American Psychiatric Publishing Textbook of Psychosomatic Medicine: psychiatric care of the medically ill. American Psychiatric Pub: USA; 2011.
28. McLean SA, Paxton SJ. Body image in the context of eating disorders. Psychiatric Clinics 2019; 42(1):145-156.
29. Monro F, Huon G. Media-portrayed idealized images, body shame, and appearance anxiety. Int J Eat Disord 2005; 38(1):85-90.
30. Morgan JF, Reid F, Lacey, J. H. The SCOFF questionnaire. West J Med 2000; 172(3):164.
31. Napolitano F, Bencivenga F, Pompili E, Angelillo IF. Assessment of knowledge, attitudes, and behaviors toward eating disorders among adolescents in Italy. Int J Environ Res Public Health 2019; 16(8):1448.
32. Nivedita N, Sreenivasa G, Rao TS, Malini SS. Eating disorders: Prevalence in the student population of Mysore, South India. Indian J psychiatry 2018; 60(4):433.
33. Núñez-Navarro A, Agüera Z, Krug I, Jiménez-Murcia S, Sánchez I, Araguz N, Gorwood P, Granero R, Penelo E, Karwautz A. Do men with eating disorders differ from women in clinics, psychopathology and personality? Eur Eat Disord Rev 2012; 20(1):23-31.
34. Rauof M, Ebrahimi H, Jafarabadi MA, Malek A, Kheiroddin JB. Prevalence of eating disorders among adolescents in the Northwest of Iran. Iran Red Crescent Med J 2015; 17(10):e19331.
35. Rodgers RF, O'Flynn JL, McLean SA. (2019). Media and Eating Disorders. The International Encyclopedia of Media Literacy, John Wiley & Sons: USA; 2019:1-10.
36. Rojo-Moreno L, Arribas P, Plumed J, Gimeno N, García-Blanco A, Vaz-Leal F, Vila ML, Livianos L. Prevalence and comorbidity of eating disorders among a community sample of adolescents: 2-year follow-up. Psychiatry Res 2015; 227(1):52-57.
37. Rosen DS. Identification and management of eating disorders in children and adolescents. Pediatrics 2010; 126(6):1240-1253.
38. Rutters F, Nieuwenhuizen AG, Lemmens SG, BornJM, Westerterp-Plantenga MS. Acute stress-related changes in eating in the absence of hunger. Obesity 2009; 17(1): 72-77.
39. Sánchez-Armass O, Drumond-Andrade FC, Wiley AR, Raffaelli M, Aradillas-García C. Evaluation of the psychometric performance of the SCOFF questionnaire in a Mexican young adult sample. Salud Pública de México 2012; 54(4):375-382.
40. Sim LA, Lebow J, Weiss K, Harrison T, Bruce B. Eating disorders in adolescents with chronic pain. J Pediatr Health Care 2017; 31(1):67-74.
41. Steinman J, Shibli-Rahhal A. Anorexia Nervosa and Osteoporosis: Pathophysiology and Treatment. J Bone Metab 2019; 26(3):133-143.
42. Stokes DM, Clemens CF, Rios DI. Brown beauty: Body image, Latinas, and the media. JFamily Strengths 2016; 16(1):8.
43. Tanofsky-Kraff M, Schvey NA, Grilo CM. A developmental framework of binge-eating disorder based on pediatric loss of control eating. Am Psychol 2020; 75(2):189.
44. Treasure J, Sepulveda A, MacDonald P, Whitaker W, Lopez C, Zabala M, Kyriacou O, Todd G. The assessment of the family of people with eating disorders. Eur Eat Disord Rev 2008; 16(4):247-255.
45. Uchôa FNM, Uchôa NM, Daniele TMC, Lustosa RP, Garrido ND, Deana NF, Aranha ÁCM, Alves N. Influence of the mass media and body dissatisfaction on the risk in adolescents of developing eating disorders. Int J Environ Res Public Health 2019; 16(9):1508.
46. Vardar E, Erzengın M. The prevalence of eating disorders (EDs) and comorbid psychiatric disorders in adolescents: a two-stage community-based study. Turk J Psychiatry 2011; 22(4):205-212.