MEDICAL SCIENCE

The prevalence of eating disorders in Makkah, Saudi Arabia

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ABSTRACT

Background: Eating disorders are prevalent health conditions that affect any age, in particular adolescents. While perceived social pressure to be thin has a significant influence on disordered eating in early and middle adolescence, that in late adolescence is less well understood. Evidence suggests that the prevalence of eating problems has grown. *Methods:* A descriptive cross-sectional study was carried out to examine the prevalence of eating disorders using the EAT-26 and body dysmorphic disorder questionnaires among the general population in Makkah, Saudi Arabia. *Results:* Of the 426 participants, the prevalence of high levels of eating disorder concerns was 34.5%, problematic eating behaviour was 44.6% and the need for referral to a mental health professional was 55.9%. Body dysmorphic disorder affected 2.6% of the participants. Its prevalence differed significantly based on their age and among underweight and obese participants compared with their healthy-weighted and overweight groups. *Conclusion:* The findings underline the need to enhance knowledge of the significance of healthy eating habits and regular physical activity to improve body shape, shape perception and overall happiness.

Keywords: Eating disorders, screening, body dysmorphic disorder, Saudi Arabia

1. INTRODUCTION

Abnormal eating behaviours and attitudes such as compulsive overeating, chronic undereating, self-induced vomiting and using diet medications are symptoms of psychological and nutritional problems. If left untreated, they may progress to serious eating disorders impacting both psychological and affective health and leading to major morbidity, death and mental problems (Almuhlafi et al., 2018; Fairburn et al., 1998).

Eating disorders are often related to neglecting bodily sensations of hunger and fullness, resulting in body image disturbance and dissatisfaction (Schuck et al., 2018). Eating disorders are a wide range of serious psychological diseases that can interfere with daily activities. The

identification of these diseases may be missed or misdiagnosed with other diseases due to the complexity and misunderstanding of eating disorders. This can lead to physical, mental, psychosocial and socioeconomic disturbance (Eapen et al., 2006; Brewerton, 2015; Alfhaid et al., 2021; Tomar & Antony, 2021). The early diagnosis of these illnesses can relieve a huge burden on the healthcare system and improve the quality of life of patients. Eating disorders are a particularly prevalent and common health condition among teenagers and young adults.

Historically, eating disorders were believed to occur mainly in affluent western cultures, especially among women. However, over the last two decades, epidemiological data have shown that eating disorders have increased dramatically across all ethnic, cultural and socioeconomic groups (Qian et al., 2013; Qian et al., 2021; Galmiche et al., 2019). Recently, studies in Arab countries have revealed the high incidence of abnormal eating attitudes and behaviours (Fath Al Alim et al., 2012; Al Sabbah and Muhsineh, 2016; Kazim et al., 2017; Bano et al., 2013). Adolescents account for about 1.2 billion of the world's population, with 88% of them living in developing countries including in the Arab world. In Saudi Arabia, adolescents account for about 14.5% of the country's total population of 33 million (Van Liere et al., 2017).

Recent research has examined eating disorder prevalence in Saudi Arabia using different measures, finding that three times as many women as men are sufferers and showing an incidence of binge eating disorders of 18.8% (19% women, 18.2% men) (Jawed et al., 2020). Other research has found a considerable likelihood of a negative body image as well as unhealthy eating behaviors among college students. For example, a study in the UAE reported that one-third of their participants had moderate-to-severe binge eating disorders, with a median Emotional Eating Score of 23.5 among 236 young men and women (Schulte, 2016). Warning signs of an addiction to the internet and avoidance of one's body image are both significant signs of female eating disorders. A total of 392 young individuals in France, of whom 68% were female, participated in a study that examined how much time they spent online, the signs of Internet addiction, disordered eating and avoiding negative body images. Internet addiction was reported by 11% of the men and 9.7% of the women, with 54% of the variability in disordered eating (Rodgers et al., 2013). Therefore, the nutritional profile, body image and weight of adolescents in the region must receive more attention to decrease the disease burden in adulthood (Agras, 2001).

Eating disorders are related with a variety of different factors such as depression, social stressors and the desire to achieve the ideal body weight, which is considered as the predominant factor (Sander et al., 2021). Female adolescents are more common to suffer from eating disorders than men and other age groups (Yu and Tan, 2016; Qian et al., 2013; Hoek and Van Hoeken, 2003). Eating disorders usually arise during adolescence due to physical changes during puberty when girls experience a gain in body fat. The media, parents, athletes and peers are the most significant determinants of body image disturbance. Body dissatisfaction is exacerbated by media exposure to celebrities' ideal body types, which might alter girls' perceptions of their own bodies (Almuhlafi et al., 2018). Even parents who engage in eating disorder activities have a negative impact on their children, who have been found to be at a higher risk than children whose parents do not engage in such behaviours (Almuhlafi et al., 2018; Erriu et al., 2020).

While most studies of adolescent nutritional profiles in Saudi Arabia have focused on obesity, which is considered to be an epidemic, relatively few studies examine the opposite end of the body mass index (BMI) scale in teenagers. The proportion of underweight individuals in Riyadh, Saudi Arabia is alarmingly high compared with similar countries in the region (Al Muammar and El Shafie, 2014). The sample size of the study by Al Muammar and El Shafie, (2014) was small and only included girls aged 12 to 15 years. The Jeeluna® study, which is the only nationally representative research of variables related to underweight, body image, and weight reduction in Saudi Arabia, reported a prevalence of underweight (BMI < 5th percentile for age and sex) of 15.2% among a sample of approximately 12,500 adolescents (Hijji et al., 2021).

Eating disorder and body image research among the general population in Arab nations, notably Saudi Arabia, is rare. Hence, given the seriousness of the issue and lack of understanding of eating patterns, the current study aimed to investigate the eating disorders' prevalence in the general population in Makkah, Saudi Arabia to evaluate general population' perception of their body image and need for professional mental health consultation.

2. MATERIALS AND METHODS

This was descriptive cross-sectional research carried out in Makkah, Saudi Arabia. The research had 426 subjects. The size of the sample was determined by using a formula that taken into account the population size of Makkah city, the z-score, the margin of error and the standard deviation. The web-based, self-enrolment questionnaire that was constructed using Google Forms and sent to participants via social media for a period of two months commencing in November 2022. It was needed that participants in the research provide their permission before they could take part.

Measures

The self-administered questionnaire was based on previously conducted surveys with psychometric properties that have addressed eating disorders and behaviours and body dysmorphic disorder (BDD). Demographic data included age, sex, weight and height.

Body Mass Index (BMI)

The body mass index was calculated by taking the individual's total body weight in kilograms and dividing that number by the square of their height (m^2). BMI categories were defined according to the Centers for Disease Control and Prevention (CDC) guidelines as follows: underweight (BMI < 18.5), healthy weight (BMI 18.5 to 24.9), overweight (BMI 25 to 29.9) and obese (≥ 30).

Eating attitude test (EAT-26) and eating behaviour survey

In this study, eating disorders were assessed using the EAT-26 questionnaire and eating behaviour survey. In 1982, Garner and Garfinkel developed the EAT-26 (Garner et al., 1982). The EAT-26 has been especially successful as a screening measure for assessing the likelihood of eating disorders. It is a 26-item multidimensional self-report measure that examines attitudes, behaviours and eating disorder symptoms linked to eat, for which participants provide their responses on a six-item Likert scale from Never (0) to Always (5). However, in this study, the first 25 items were recorded on a four-point scale as follows: 0 for "Never", "Rarely" and "Sometimes"; 1 for "Often"; 2 for "Usually"; and 3 for "Always". The last question was recorded as follows: 0 for "Always", "Usually" and "Often"; 1 for "Sometimes"; 2 for "Rarely"; and 3 for "Never". The total score was computed by adding the scores of the relevant items; a high level of eating disorder concerns was deemed at a total score of ≥ 20. Risk of eating disorders (defined as a score of 20 or higher as high risks), problematic eating behavior (defined as a score of 20 or higher on EAT–26, or a score of any of the five behavioral questions) and the need for a referral to a mental health professional were the study's three main outcomes. The eating behaviour survey had five questions. When certain things were ticked off, as described before, an unhealthy pattern of eating was taken into consideration. In this study, having a high degree of concern about an eating disorder or a problematic eating habit was defined as the prerequisite for referral to a specialist in the field of mental health.

The EAT-26 subscales

The EAT-26 questionnaire consisted of three subscales, including dieting (13 items), bulimia (6 items) and food preoccupation and oral control (7 items). The scores for these domains were obtained by summing up the relevant items and the scores ranged between 0 and 39 for dieting, 0 and 18 for bulimia and 0 and 21 for food preoccupation and oral control.

Body Dysmorphic Disorder (BDD) questionnaire

The BDD questionnaire, which consisted of six major questions, was used to evaluate individuals suspected of having BDD. Five items were related to appearance concerns among the participants and one item was related to the impact of appearance concerns on the lives or routines of friends and family. The third question was divided into four subitems. If the participants replied "Yes" to the first two questions and any of the four subitems of the third question as well as admitted to spending one hour or more thinking about their appearance, a BDD diagnosis was made for that individual (as a response to the fourth question).

Statistical analysis

Data analysis was carried out using SPSS version 25. Frequencies and percentages were used to express the categorical variables. The statistical reliability was assessed using the Cronbach's alpha test. Statistical differences between groups were assessed using the Fisher's exact test or Pearson's Chi-squared test whenever applicable. The differences in the scores of bulimia, oral control and dieting were assessed using a Kruskal - Wallis rank sum test (for variables with three or more categories) or a Wilcoxon rank sum test (for variables with two categories). Statistical significance was considered at $p < 0.05$.

3. RESULTS

Characteristics of the participants' demographics

Initially, 429 responses were reported on the online platform. However, we excluded three records of individuals who declined to participate. Therefore, we analysed the responses of 426 respondents in the current study. The majority of the participants were aged 15 to 29 years (60.6%) and women (94.8%). Overweight and obese participants represented 23% and 19.5% of the sample, respectively (Table 1).

Table 1 Characteristics of the participants' demographics

Parameter	Category	N (%)
Age	Under 15	11 (2.6%)
	15 to 29	258 (60.6%)
	30 to 44	45 (10.6%)
	45 to 65	112 (26.3%)
Sex	Male	22 (5.2%)
	Female	404 (94.8%)
BMI	Underweight	75 (17.6%)
	Healthy	170 (39.9%)
	Overweight	98 (23.0%)
	Obese	83 (19.5%)

Reliability analysis

The results of the reliability analysis showed that the Cronbach's alpha coefficients were adequately consistent for the EAT-26 questionnaire (alpha = 0.886, no. of items = 26), eating behaviours (alpha = 0.659, no. of items = 5) and BDD (alpha = 0.762, no. of items = 9). Regarding the three subscales of EAT-26, Cronbach's alpha coefficients were generally very good to excellent (0.710, 0.880 and 0.841 for dieting, bulimia and food preoccupation and oral control, respectively, Table 2).

Table 2 Description of the three subscales of the EAT-26 questionnaire.

Subscale	Items	Cronbach alpha	Mean ± SD	Range
Dieting	13	0.710	10.11 ± 9.08	0-37
Bulimia and food preoccupation	6	0.880	2.37 ± 3.70	0-18
Oral control	7	0.841	5.33 ± 4.47	0-21

SD: Standard deviation

Statistical differences in the EAT-26 subscales

There were age-related differences in the scores of oral controls ($p = 0.007$) and dieting ($p < 0.001$). Additionally, the increase in BMI levels accounted for a reduction in the mean scores of oral controls ($p < 0.001$) and consistent increments in the scores of dieting ($p < 0.001$) and bulimia ($p < 0.001$). Finally, oral control scores were significantly higher among females compared to males ($p = 0.002$, Table 3).

Table 3 Demographic differences in the subscales of the EAT-26 questionnaire.

Parameter	Category	Oral control		Dieting		Bulimia	
		Mean ± SD	p-value	Mean ± SD	p-value	Mean ± SD	p-value
Age	Less than 15	4.00 ± 3.13	0.007	10.55 ± 6.50	< 0.001	3.09 ± 2.55	0.099
	15 to 29	5.14 ± 4.62		8.68 ± 8.84		2.13 ± 3.55	
	30 to 44	7.42 ± 4.87		10.56 ± 9.15		1.91 ± 2.53	
	45 to 65	5.05 ± 3.85		13.17 ± 9.13		3.04 ± 4.39	
Gender	Male	2.50 ± 1.41	0.002	10.91 ± 6.36	0.327	1.73 ± 1.88	0.784
	Female	5.48 ± 4.53		10.06 ± 9.21		2.41 ± 3.77	
BMI	Underweight	8.05 ± 4.39	< 0.001	3.63 ± 6.33	< 0.001	1.27 ± 2.18	< 0.001
	Healthy	4.91 ± 4.39		8.82 ± 8.72		1.87 ± 3.32	
	Overweight	4.87 ± 4.15		13.59 ± 8.13		2.47 ± 3.07	
	Obesity	4.27 ± 4.21		14.47 ± 8.97		4.28 ± 5.23	

Eating disorders and the associated factors

Focusing on eating disorders, the results showed that the prevalence of high levels of eating disorder concerns was 34.5%, problematic eating behaviour was 44.6% and the need for referral to a mental health professional was 55.9% (Figure 1). The

prevalence rates of the different domains of the EAT-26 questionnaire were significantly higher among those participants aged under 15 years (72.7% for eating disorder concerns, 72.7% for problematic eating behaviour and 72.7% for the need for referral to a mental health professional), as well as those aged 30 to 44 years (44.4% for eating disorder, 60.0% for problematic eating behaviour and 71.1% for the need for referral to a mental health professional) and 45 to 65 years (48.2% for eating disorder concerns, 56.2% for problematic eating behaviour, and 68.8% for the need for referral to a mental health professional) compared with those aged 15 to 29 years (25.2% for eating disorder concerns, 35.7% for problematic eating behaviour and 46.9% for the need for referral to a mental health professional). The p values for all the comparisons were statistically significant ($p < 0.001$). The proportions of eating disorders increased consistently with an increase in the BMI. These included high levels of eating disorder concerns (14.7% for underweight, 27.6% for healthy weight, 48% for overweight and 50.6% for obese, $p < 0.001$), problematic eating behaviour (14.7% for underweight, 40% for healthy weight, 58.2% for overweight, and 65.1% for obese, $p < 0.001$) and the need for referral to a mental health professional (14.7% for underweight, 50.6% for healthy weight, 72.4% for overweight, and 77.1% for obese, $p < 0.001$, Table 4).

Table 4 Factors associated with different domains of the EAT-26 survey.

Parameter	Category	Eating disorder			Problematic eating behavior			Need for referral to a mental health professional		
		No, N = 279	Yes, N = 147	p	No, N = 236	Yes, N = 190	p	No, N = 188	Yes, N = 238	p
Age	Less than 15	3 (27.3%)	8 (72.7%)	< 0.001	3 (27.3%)	8 (72.7%)	<0.001	3 (27.3%)	8 (72.7%)	< 0.001
	15 to 29	193 (74.8%)	65 (25.2%)		166 (64.3%)	92 (35.7%)		137 (53.1%)	121 (46.9%)	
	30 to 44	25 (55.6%)	20 (44.4%)		18 (40.0%)	27 (60.0%)		13 (28.9%)	32 (71.1%)	
	45 to 65	58 (51.8%)	54 (48.2%)		49 (43.8%)	63 (56.2%)		35 (31.2%)	77 (68.8%)	
Gender	Male	14 (63.6%)	8 (36.4%)	0.851	8 (36.4%)	14 (63.6%)	0.065	6 (27.3%)	16 (72.7%)	0.102
	Female	265 (65.6%)	139 (34.4%)		228 (56.4%)	176 (43.6%)		182 (45.0%)	222 (55.0%)	
BMI	Underweight	64 (85.3%)	11 (14.7%)	< 0.001	64 (85.3%)	11 (14.7%)	<0.001	58 (77.3%)	17 (22.7%)	< 0.001
	Healthy	123 (72.4%)	47 (27.6%)		102 (60.0%)	68 (40.0%)		84 (49.4%)	86 (50.6%)	
	Overweight	51 (52.0%)	47 (48.0%)		41 (41.8%)	57 (58.2%)		27 (27.6%)	71 (72.4%)	
	Obesity	41 (49.4%)	42 (50.6%)		29 (34.9%)	54 (65.1%)		19 (22.9%)	64 (77.1%)	

BDD and associated factors

BDD was prevalent among 2.6% of the participants (Figure 1). Table 5 presents the responses of the participants to the BDD questionnaire. BDD differed significantly based on the participants' age, with 8.9% aged 30 to 44 years having BDD compared with 0%, 2.7% and 0% of those aged under 15 years, 15 to 29 years and 45 to 65 years ($p = 0.019$). Furthermore, BDD was significantly higher among underweight (8%) and obese participants (4.8%) than their healthy-weighted (0%) and overweight peers (1%, $p < 0.001$, Table 6).

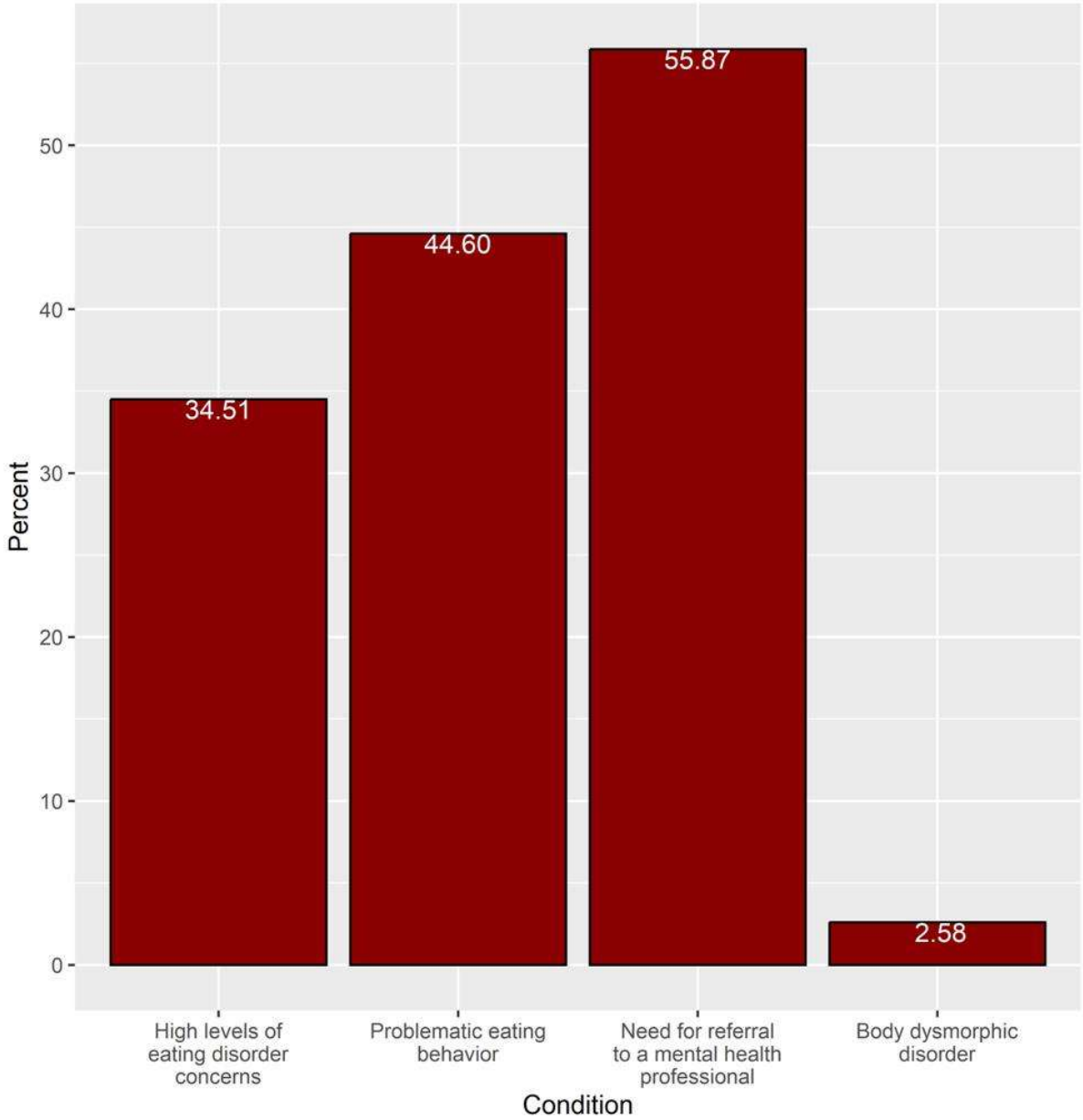

Figure 1 The prevalence of eating disorders (three conditions) and BDD.

Table 5 Participants' responses to the items of the BDD questionnaire.

Parameter	Category	N (%)
1. Are you worried about how you look?	No	131 (30.8%)
	Yes	295 (69.2%)
2. Do you think about your appearance problems a lot and wish you could think about them less? *	No	204 (54.0%)
	Yes	174 (46.0%)
3.a. Has your defect(s) caused you a lot of distress or emotional pain? ¥	No	196 (49.7%)
	Yes	198 (50.3%)
3.b. Has it significantly interfered with your social life?	No	310 (72.8%)
	Yes	116 (27.2%)
3.c. Has your defect(s) significantly interfered with your school work or your job?	No	396 (93.0%)
	Yes	30 (7.0%)
3.d. Are there things you avoid because of your defect(s)?	No	268 (62.9%)
	Yes	158 (37.1%)

4. On an average day, how much time do you usually spend thinking about how you look?	Less than 1 hour a day	305 (71.6%)
	1 to 3 hours a day	89 (20.9%)
	More than 3 hours a day	32 (7.5%)
5. Is your main concern with how you look that you are not thin enough or that you might get too fat?	No	184 (43.2%)
	Yes	242 (56.8%)
6. Have the lives or normal routines of your family or friends been affected by your appearance concerns?	No	369 (86.6%)
	Yes	57 (13.4%)

*The item had 48 missing records ¥the item had 32 missing records

Table 6 Factors associated with BDD.

Parameter	Category	BDD		
		No, N = 415	Yes, N = 11	p
Age	Under 15	11 (100.0%)	0 (0.0%)	0.019
	15 to 29	251 (97.3%)	7 (2.7%)	
	30 to 44	41 (91.1%)	4 (8.9%)	
	45 to 65	112 (100.0%)	0 (0.0%)	
Sex	Male	22 (100.0%)	0 (0.0%)	> 0.999
	Female	393 (97.3%)	11 (2.7%)	
BMI	Underweight	69 (92.0%)	6 (8.0%)	< 0.001
	Healthy	170 (100.0%)	0 (0.0%)	
	Overweight	97 (99.0%)	1 (1.0%)	
	Obese	79 (95.2%)	4 (4.8%)	

Focusing on patients with BDD, the proportion of the participants without a need for referral to a mental health professional was significantly higher than those with a need for referral (4.8% vs 0.8%, respectively, p = 0.013). However, BDD did not differ significantly based on whether the participants had a high level of eating disorder concerns or not (3.2% vs 1.4%, p = 0.344) or had problematic eating behaviour or not (3.8% vs 1.1%, p = 0.122, Figure 2).

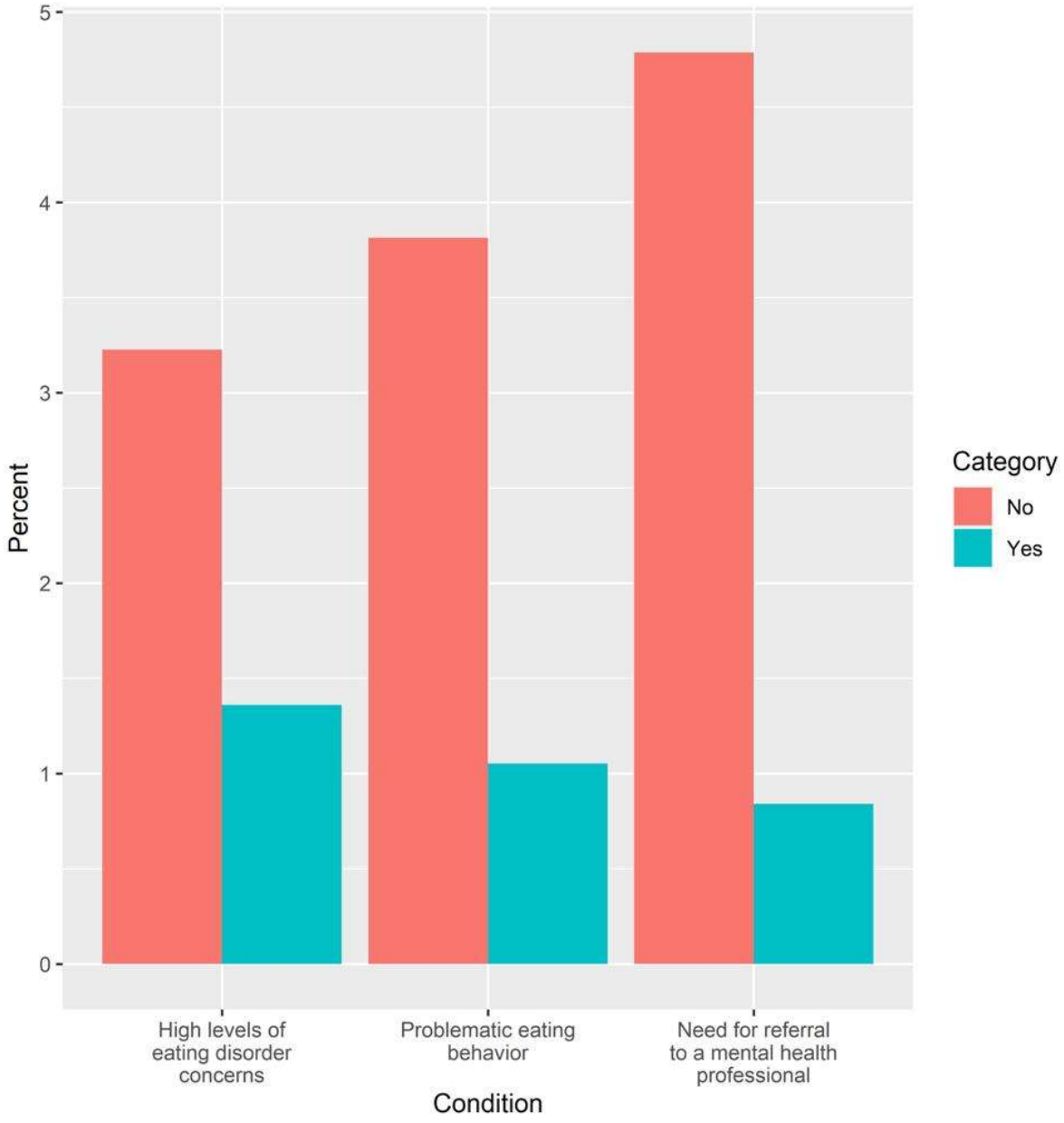

Figure 2 The proportions of eating disorders among those participants with BDD.

4. DISCUSSION

Issues such as body dissatisfaction are more likely to occur throughout adolescence and young adulthood than during other developmental stages. Eating disorders might be the outcome of these issues. Hence, the purpose of this research was to determine the extent to which among the general population in Makkah, Saudi Arabia suffer from eating disorders and BDD. The research findings showed that the majority of the respondents were women (94.8%) and aged 15 to 29 years (60.6%). The participants who were obese or overweight comprised 23% and 19.5% of the sample, respectively. The results that focused on eating disorders revealed that 34.5% of the participants had significant levels of eating disorder concerns, 44.6% had problematic eating behaviour and 55.9% needed to be referred to a professional in the field of mental health. Comparable investigations to the current research have been carried out using the same measurement tool in many countries. In Saudi Arabia, studies have found that 19.4% of women have the potential to develop eating disorders (Al-Subaie et al., 1996) compared with 33% in Oman (Al-Adawi et al., 2002), 27.4% in the UAE (Eapen et al., 2006) and 23.4% in Brazil (Vilela et al., 2004). Using SCOFF screening measurement, many studies reported high level of risk of eating disorders especially among adolescents in Makkah city. A study in primary health care settings found more than 50% of the respondents had the risk of eating disorders (Hariri, 2023). Another study in secondary schools revealed 46% of adolescents had greater risk of eating disorders.

Certain groups have a greater incidence of suffering eating disorders. In this research, we found, using the EAT-26 questionnaire, that eating disorders were significantly higher among participants aged under 15 years as well as those aged 30 to 44 years. According to earlier research, eating disorders are the most prevalent between the ages of 14 and 25 (Machado et al., 2007; Gonzalez et al., 2007). In addition, young adults are a particularly vulnerable group (Machado et al., 2007). Previous research with adolescents has shown links among body weight, weight management concerns and behaviours and eating disorder symptoms. According to our findings, the incidence of eating disorders has been rising proportionally with the BMI. This includes elevated levels of eating disorder concerns (14.7% for underweight, 27.6% for healthy weight, 48% for overweight and 50.6% for obese, $p = 0.001$), problematic eating behaviour (14.7% for underweight, 40.0% for healthy weight, 58.2% for overweight, and 65.1% for obese, $p = 0.001$), and the need for referral to a mental health professional (14.7% for underweight, 50.6% for healthy weight, 72.4%).

A negative body image perception and low self-esteem may have health-related implications such as stressor symptoms and a higher risk of developing clinical eating disorders, especially in adolescence (Rosenvinge and Pettersen, 2015; Bibiloni et al., 2013). In this research, we found that BDD was reported by 2.6% of the subjects. There was a statistically significant age-related gap in the prevalence of BDD among the individuals in the study, with 8.9% of those aged 30 to 44 years having the disorder compared with 0%, 2.7% and 0% among those aged under 15 years, 15 to 29 years and 45 and 65 years, respectively ($p = 0.019$). Previous research (Duchin et al., 2015, Radwan et al., 2019) has suggested that the prevalence of body image dissatisfaction among female teenagers in western nations ranges between 35% and 81% compared with between 16% and 55% among male adolescents. In addition, the prevalence of BDD was found to be considerably greater among individuals who were either underweight (8%) or obese (4.8%) compared with their counterparts who were either healthy-weighted (0%, $p = 0.001$) or overweight (1%, $p = 0.001$).

5. CONCLUSION

It is vital to conduct research to understand the various facets of body dissatisfaction and repercussions of this phenomenon. Teenagers and adults are at a higher risk of developing eating behaviour disorders if they consume an unhealthy diet; therefore, receiving ongoing psychological therapy may be of great assistance to mitigating those risks. The fashion and beauty sector has an incredible opportunity to be a driving force in the fight against the normalization of harmful behaviours especially among young people.

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Authors' contributions

Conceptualization, NH, EA, MU, SA, MA; methodology, NH, HA, EA; data collection, EA, MU, SA, MA; writing—original draft preparation, NH, EA; and writing—review and editing, NH, EA, HA. All the authors have read and agreed to the published version of the manuscript.

Ethical approval

The human institutional ethics committee of the Umm Al-Qura University's medical school granted approval to the study (HAPO-02-K-012-2022-09-1181).

Informed consent

Written informed consent was obtained from all individual participants included in the study.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

REFERENCES AND NOTES

1. Agras WS. The consequences and costs of the eating disorders. Psychiatr Clin N Am 2001; 24:371-379.
2. Al Muammar M, El Shafie M. Association between dietary habits and body mass index of adolescent females in intermediate schools in Riyadh, Saudi Arabia. East Mediterr Health J 2014; 20(1):39-45.
3. 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. Arab J Nutri Exer 2016; 62-76.
4. Al-Adawi S, Dorvlo AS, Burke DT, Al-Bahlani S, Martin RG, Al-Ismaily S. Presence and severity of anorexia and bulimia among male and female Omani and non-Omani adolescents. J Am Acad Child Adolesc Psychiatry 2002; 41:1124-1130.
5. Alfhaid FM, Alanazi ASA, Alraddadi MMR, Alrashidi ASM, Alrashedi LSO, Alothaim AMA, Alqarni MAM, Almanaah MAM. Eating disorders among Majmaah University Students, Saudi Arabia. Medical Science 2021, 25(117);3007-3016
6. Almuhlafi M, Jamilah KA, Almutairi AF, Salam M. Relationship between early menarche, obesity and disordered eating behaviors: A school-based cross-sectional survey in Northern Saudi Arabia. Diabetes, Metabolic Syndrome and Obesity: Targets Ther 2018; 743-751.
7. Al-Subaie A, Al-Shammari S, Bamgboye E, Al-Sabhan K, Al-Shehri S, Bannah AR. Validity of the Arabic version of the Eating Attitude Test. Int J Eat Disord 1996; 20(3):321-4.
8. Bano R, Al Shammari E, Banu S. A study on the prevalence and severity of eating disorders among the young population of hail city in Saudi Arabia. Med Sci 2013; 2:159-73.
9. Bibiloni MDM, Pich J, Pons A, Tur JA. Body image and eating patterns among adolescents. BMC Public Health 2013; 13:1-10.
10. Brewerton TD. Stress, trauma and adversity as risk factors in the development of eating disorders. The Wiley handbook of eating disorders 2015; 445-460.
11. Duchin O, Marin C, Mora-Plazas M, De Leon CM, Lee JM, Baylin A, Villamor E. A prospective study of body image dissatisfaction and BMI change in school-age children. Public Health Nutr 2015; 18:322-328.
12. Eapen V, Mabrouk AA, Bin-Othman S. Disordered eating attitudes and symptomatology among adolescent girls in the United Arab Emirates. Eat Behav 2006; 7:53-60.
13. Erriu M, Cimino S, Cerniglia L. The Role of Family Relationships in Eating Disorders in Adolescents: A Narrative Review. Behav Sci (Basel) 2020; 10(4):71.
14. Fairburn CG, Doll HA, Welch SL, Hay PJ, Davies BA, O'Connor ME. Risk factors for binge eating disorder: A community-based, case-control study. Arch Gen Psychiatry 1998; 55(5):425-32.
15. Fath Al Alim MA, Noon HA, Abdelghani A. Eating disorders symptoms among university students: An exploratory study. Sudan Med J 2012; 48:186-193.
16. Galmiche M, Déchelotte P, Lambert G, Tavolacci MP. Prevalence of eating disorders over the 2000-2018 period: A systematic literature review. Am J Clin Nutr 2019; 109(5):1402-1413.
17. Garner DM, Olmsted MP, Bohr Y, Garfinkel PE. The eating attitudes test: Psychometric features and clinical correlates. Psychol Med 1982; 12(4):871-8.
18. Gonzalez A, Kohn MR, Clarke SD. Eating disorders in adolescents. Aust Fam Physician 2007; 36(8):614-9.
19. Hariri N. Screening the risk of eating disorders among adolescents in primary care centres in Makkah, Saudi Arabia. Middle East J Fam Med 2023; 7:40.
20. Hijji TM, Saleheen H, AlBuhairan FS. Underweight, body image and weight loss measures among adolescents in Saudi Arabia: Is it a fad or is there more going on? Int J Pediatr Adolesc Med 2021; 8(1):18-24.
21. Hoek HW, van Hoeken D. Review of the prevalence and incidence of eating disorders. Int J Eat Disord 2003; 34(4):383-96.
22. Jawed A, Harrison A, Dimitriou D. The Presentation of Eating Disorders in Saudi Arabia. Front Psychol 2020; 11:586706.
23. Kazim A, Almarzooqi M, Karavetian M. The prevalence and determents of eating disorders among Emirati female students aged 14–19 years in Ajman, UAE. J Food Nutr Disord 2017; 6:2.
24. Machado PP, Machado BC, Gonçalves S, Hoek HW. The prevalence of eating disorders not otherwise specified. Int J Eat Disord 2007; 40(3):212-7.
25. Qian J, Hu Q, Wan Y, Li T, Wu M, Ren Z, Yu D. Prevalence of eating disorders in the general population: A systematic review. Shanghai Arch Psychiatry 2013; 25(4):212-23.
26. Qian J, Wu Y, Liu F, Zhu Y, Jin H, Zhang H, Wan Y, Li C, Yu D. An update on the prevalence of eating disorders in the general population: A systematic review and meta-analysis. Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity 2021; 1-14.
27. Radwan H, Hasan HA, Ismat H, Hakim H, Khalid H, Al-Fityani L, Mohammed R, Ayman A. Body Mass Index Perception, Body Image Dissatisfaction and Their Relations with Weight-Related Behaviors among University Students. Int J Environ Res Public Health 2019; 16(9):1541.

28. Rodgers RF, Melioli T, Laconi S, Bui E, Chabrol H. Internet addiction symptoms, disordered eating and body image avoidance. Cyberpsychol Behav Soc Netw 2013; 16(1):56-60.
29. Rosenvinge JH, Pettersen G. Epidemiology of eating disorders part II: An update with a special reference to the DSM-5. Adv Eat Disord Theo Res Prac 2015; 3:198-220.
30. Sander J, Moessner M, Bauer S. Depression, Anxiety and Eating Disorder-Related Impairment: Moderators in Female Adolescents and Young Adults. Int J Environ Res Public Health 2021; 18(5):2779.
31. Schuck K, Munsch S, Schneider S. Body image perceptions and symptoms of disturbed eating behavior among children and adolescents in Germany. Child Adolesc Psychiatry Ment Health 2018; 12:10.
32. Schulte SJ. Predictors of binge eating in male and female youths in the United Arab Emirates. Appetite 2016; 105:312-9.
33. Tomar R, Antony VC. Assessment of eating disorder and obesity among youth in Saudi Arabia. Medical Science, 2021, 25(116);2660-2669
34. Van Liere M, Bhutta ZA, Hartvig-Blomberg J, Mahmood S. Embodying the Future: How to Improve the Nutrition Status of Adolescent Girls in Pakistan 2017.
35. Vilela JE, Lamounier JA, Dellaretti Filho MA, Barros Neto JR, Horta GM. Transtornos alimentares em escolares (eating disorders in school children). J Pediatr (Rio J) 2004; 80(1):49-54.
36. Yu Z, Tan M. Disordered Eating Behaviors and Food Addiction among Nutrition Major College Students. Nutrients 2016; 8(11):673.