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Original article

Does obesity in young women associated with mindful eating and disordered eating behaviors?

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Abstract. *Background and aim:* The onset of obesity has been associated with low levels of mindful eating and disordered eating behaviors. This study examined the relationship between mindful eating, disordered eating behavior and obesity in young women. *Methods:* This cross-sectional study included 227 young women aged between 19-35 years. Mindful Eating Questionnaire (MEQ) and Eating Attitudes Test (EAT)-26 were used. Weight and body composition were obtained and the measurements of neck circumference (NC), waist circumference (WC), hip circumference (HC) were measured. Body mass index (BMI), waist-to-hip ratio (WHR) and waist-to-height ratio (WHtR) were calculated. *Results:* Overall, the underweight participants had the highest MEQ scores, while the obese participants had the lowest MEQ scores ($p<0.05$). MEQ scores had a negative correlation with BMI, fat mass, WHR, WHtR, NC and WC ($r=-0.216$, $p<0.01$; $r=-0.234$, $p < 0.01$; $r=-172$, $p<0.01$ and $r=-0.244$, $p<0.01$, $r=-0.145$, $p<0.05$; $r=-0.238$, $p<0.05$, respectively). EAT-26 scores had a very weak positive correlation between WHtR ($r=0.131$, $p<0.05$). There is a very weak negative correlation between MEQ and EAT-26 scores ($r=-0.072$, $p>0.05$). *Conclusion:* To sum up, mindful eating and disordered eating behavior have negative relation between obesity. In future studies, conducting research on larger sample numbers will improve the findings on the subject.

Key words: Mindful eating, Eating disorders, Eating behavior, Obesity

Introduction

Disordered eating behaviors and unmindful eating are potential risk factors for obesity (1). Mindful eating, which has been the focus of studies in recent years, defines a non-judgmental awareness of emotional and physical sensations associated with consuming food (2-5). In other words, mindful eating is an approach to eating that focuses on participants' sensory awareness and experiences with food (6). Accompanied by mindfulness, healthier body weight and eating habits can be encouraged; thereby, mindful eating can be used as a key element to prevent obesity (7).

Along with unmindful eating behaviors, obesity is also associated with a disorder in eating behaviors (8,9). Although the etiology of disordered eating behavior is not completely clear, it is defined as a condition that may include insufficient or excessive food intake, on the other hand, is based on mental effects and can lead to physical consequences (10). A large cross-sectional study showed a significant relationship between unhealthy eating habits and obesity amongst obese participants compared to participants with normal weight (11). The relationship between gender and obesity has been investigated (12). Women tend to have a higher risk of obesity compared to men (13,14). Likewise, young women are also at greater risk for eating disorders compared to young men (15). The aim of the current study was to investigate the relationship between disordered eating behaviors, mindful eating

and obesity amongst young female adults. It has been hypothesized that the mindful eating is related with disordered eating behavior and obesity.

Materials and methods

Participants

This cross-sectional study is included 227 female subjects aged 19-35 who were living in Famagusta, North Cyprus. All participants in the study signed the informed consent form and participated in the study voluntarily. The inclusion criteria of the study are: living at Famagusta, being a woman, being a Turkish speaker, and being aged between 19 and 35. Participants not living in Famagusta and not native Turkish speaker, who are younger than 19 and older than 35, pregnant and lactating participants were excluded from the study.

The study was approved by the Ethics Committee of Eastern Mediterranean University (No: 2020/06 and Date 29/09/2020). The data collection was carried out from September 2020 to June 2021. The participants were recruited both by word of mouth and by advertisements through social media. Face-to-face interviews were conducted using a questionnaire including questions regarding demographic characteristics (age, occupation, level of education), smoking habits, dietary habits were used for collecting information from the participants. Also, diagnosed diseases were questioned to determine the health status of the participants. Mindful Eating Questionnaire (MEQ) and Eating Attitudes Test (EAT-26) were used to evaluate eating behaviour of participants. In addition, body weight and height were obtained and used for the calculation of body mass index by researchers.It was determined by a simple random sampling method and that a sample size of 203 people would be needed at a 95% confidence level and a 5% confidence interval, aiming to have a statistical power of 80% and above. Considering the unpredictable changes that may cause a decrease in statistical power in the research conditions, it was decided to increase the sample size by approximately 10% to 227 people.

Eating attitudes test (EAT-26)

EAT-26 was developed to measure the eating attitudes of participants between the ages of 11-70 and possible disorders in their eating behaviors (16). The validity and reliability study was adapted into Turkish by Ergüney-Okumuş and Sertel-Berk. The Cronbach's alpha internal consistency coefficient was 0.84, and the test-retest stationarity coefficient was 0.78. The EAT-26 is a six-point Likert-type scale and has 3 sub-scores: dieting, bulimia and preoccupation, and oral control. Scores of 20 and above from the EAT-26 scale indicate the elevated risk of disorders in eating attitudes (17).

Mindful eating questionnaire (MEQ)

MEQ was developed to determine the associations between eating behavior, awareness and emotional state can be questioned (18). The validity and reliability study was adapted into Turkish by Kose et al. (2017). The Cronbach alpha consistency coefficient was found to be 0.733. MEQ is a Likert-type scale consisting of 30 questions. The MEQ has 7 sub-scores: disinhibition, emotional eating, eating control, focus, eating discipline, awareness, and interference. The higher the score of the scale indicates the higher the awareness of eating (19).

Anthropometric measurements

Weight and body composition were measured on a scale (Tanita BC-543, Amsterdam, The Netherlands) and height was measured with a portable stadiometer (Seca 213, Hamburg, Germany). Body mass index (BMI) was calculated from the recorded height and weight. Data from the World Health Organization were used for BMI classification (20). A BMI below 18.5 kg/m^2 is considered underweight, 18.5-24.9 kg/m^2 is considered normal weight, 25.0-29.9 kg/m2 is considered overweight, whereas a BMI above 30.0 is considered as obese 20.

Neck circumference (NC) was measured using a graduated tape from the middle point between the base of the neck and the upper part of the sternum. NCs above 34 cm are classified as high risk for

abdominal obesity (21). Waist circumference (WC) was measured halfway between the top of the lateral iliac crest and the lowest rib. The cut-off points for WC are >80 cm and >88 cm, described as risk and high risk, respectively. Hip circumference (HC) was measured at the point yielding the maximum circumference over the buttocks using a tape measure and waist-to-hip ratio (WHR) was calculated. WHR above 0.85 is described as a risk for non-communicable diseases. The waist-to-height ratio (WHtR) were calculated using measured waist circumference and height. Cut-offs for WHtR <0.50, between ≥0.50 and <0.60, and ≥0.60 are described as no risk, risk and high risk for non-communicable diseases, respectively (22).

Statistical analysis

Frequency and percentage for qualitative variables and arithmetic mean and standard deviation for quantitative variables were calculated as descriptive statistics. Parametric assumptions, including the Kolmogorov-Smirnov test of normality, were controlled and all statistical analyses were performed with non-parametric methods. Kruskal-Wallis test was applied to understand the statistical significance of differences between BMI categories. In case of significance, the Mann-Whitney U test was performed to investigate pairwise group differences. Spearman rho was calculated to analyze the associations between variables. For whole calculations and analysis, SPSS (Version 26.0 for Mac) software was used. Graphs were created using the Microsoft Excel. Statistical significance was accepted to be 0.05. Correlation coefficient (*r*) between 0.00 and 0.29, between 0.30 and 0.64, between 0.65 and 0.84 and between 0.85 and 1.00 considered as very weak, weak, moderate, strong and very strong association, respectively (23).

Results

A total of 227 female participants with an average age of 27.9±4.6 years participated in the study. As shown in Table 1, it was determined that 34.8% of the participants participating in the study were between the ages of 26-30 years. The education status of 85% of participants was university or higher. While 50.7% of participants were engaged in self-employment, 24.2% are students. The average EAT-26 score of participants was 16.8±10.2, whereas the average MEQ score of participants was 100.4±13.6. As shown, 33.5% of the participants had 20 or more from EAT-26. As indicated in Table 2, it was determined that the total scores of EAT-26 (20.29±13.35) of participants with high school or below education were higher than the scores of participants with university or higher degree (16.22±9.42) (p>0.05). The total scores of MEQ were evaluated according to the education status of the participants, it was determined that the scores of the participants with high school or below education (102.00±14.76) were higher than the scores of the others (100.07±13.35) (p>0.05).

As seen in Table 2, the underweighted participants, according to the BMI classification had the highest MEQ scores, while the obese participants had the lowest MEQ scores (p<0.05). Normal weighted participants had higher MEQ scores compared to overweighted participants (p<0.05). Likewise, the MEQ scores of normal weighted participants were higher than obese participants (p<0.05). Even there was not found statistical significance, the lowest

Table 1. Distribution of findings regarding the age, educational status, and occupation of participants (n=227).

	n	%
Age (years)		
19-25	75	33.00
26-30	79	34.80
31-35	73	32.20
Educational Status		
High school and below	34	15.00
University and above	193	85.00
Occupation		
Unemployed	7	3.10
Civil Servant	32	14.10
Self-Employment	115	50.70
Student	55	24.20
Academician	18	7.90

Table 2. Distribution of EAT-26 and MEQ scores according to educational status and BMI classification. (n=227).

	Total EAT-26 Scores	Total MEQ Scores
	($\bar{x}$ ± SD)	($\bar{x}$ ± SD)
Educational Status		
High school and below	20.29 ± 13.35	102.00 ± 14.76
University and above	16.22 ± 9.42	100.07 ± 13.35
BMI classification		
Underweight	10.3 ± 4.3	105.9 ± 10.0
Normal	16.3 ± 10.1	102.6 ± 13.5
Overweight	18.1 ± 10.5	95.7 ± 13.1[b]
Obese	19.6 ± 10.0	93.9 ± 11.6[a,b]
Total	16.8 ± 10.2	100.4 ± 13.5

[a] shows statistical significance from underweight ($p < 0.05$).
[b] shows statistical significance from normal ($p < 0.05$).

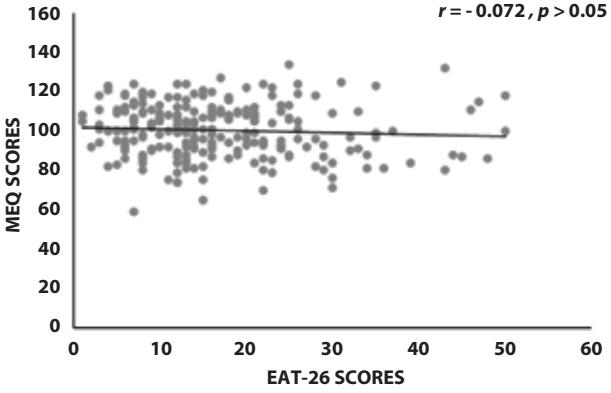

Figure 1. Correlations between EAT-26 scores and MEQ scores.

EAT-26 scores were not differed significantly according to BMI classification (p>0.05).

As can be seen in Figure 1, no statistical relation was found between MEQ scores and EAT-26 scores (p>0.05). According to Figure 2, there was a correlation only between EAT-26 and WHtR which was a very weak positive correlation (r=0.131, p<0.05). As shown in Figure 3, there was a very weak negative correlation between MEQ scores and BMI, fat mass, WHR and WHtR (r=-0.216, p<0.01; r=-0.234, p < 0.01; r=-0.172, p<0.01 and r=-0.244, p<0.01, respectively). Furthermore, a very weak negative correlation was found between MEQ and both NC and WC (r=-0.145, p<0.05; r=-0.238, p<0.05, respectively).

Discussion

Regardless of their anthropometric measurements, the MEQ and EAT-26 scores of the participants on both scales were examined, and it was determined that the mean of the EAT-26 score was 16.8±10.2 and the mean of the MEQ score was 100.4±13.5. When compared with similar studies on young female adults carried out elsewhere, the rates of disordered eating behaviors in the present study were higher than those obtained in Bangladesh (24), Nigeria (25), Palestine (26) and the United States of America (27).

A growing body of literature has investigated the relationship between WHtR and cardiometabolic risk and revealed that higher WHtR indicates the higher risk of cardiometabolic disease (28-31). Our findings were shown that participants with high WHtR also had high EAT-26 scores (p<0.05). In other words, it was determined that participants at increased cardiometabolic risk have a high risk of eating disorders. Another study conducted with young adult women similarly found the relationship between increased WHtR and increased EAT-26 (32). Conversely, a few studies observed no relationship between WHtR and the risk of disordered eating behavior in the literature (33-35).

The data of our study were collected during the COVID-19 pandemic. Possible explanations for the increased rate of disordered eating behavior risk that we have found may be attributed to the COVID-19

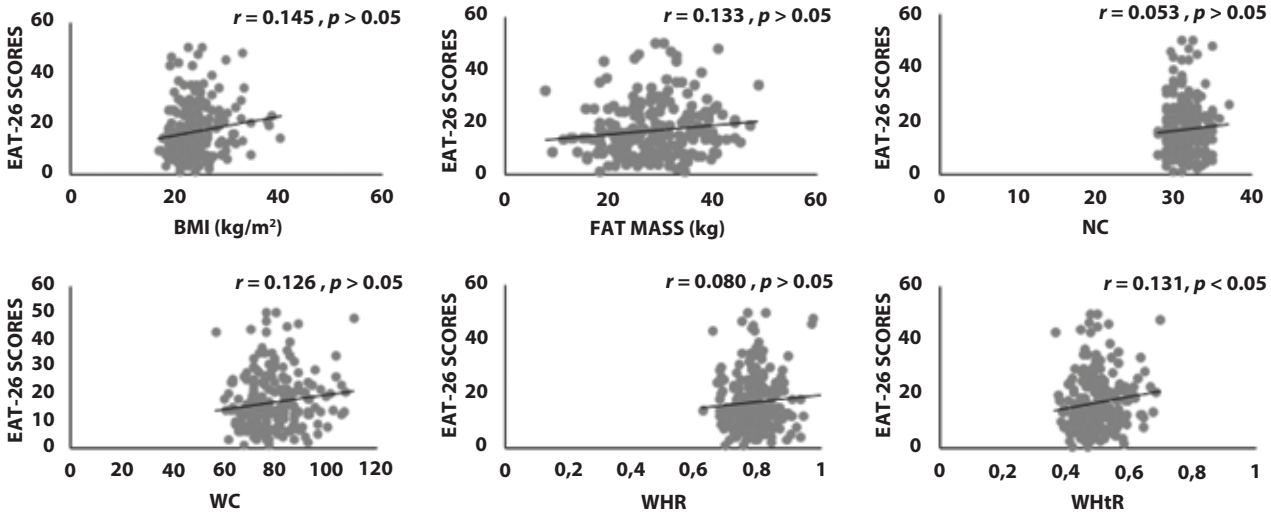

Figure 2. Correlations between EAT-26 scores and anthropometric measurements.

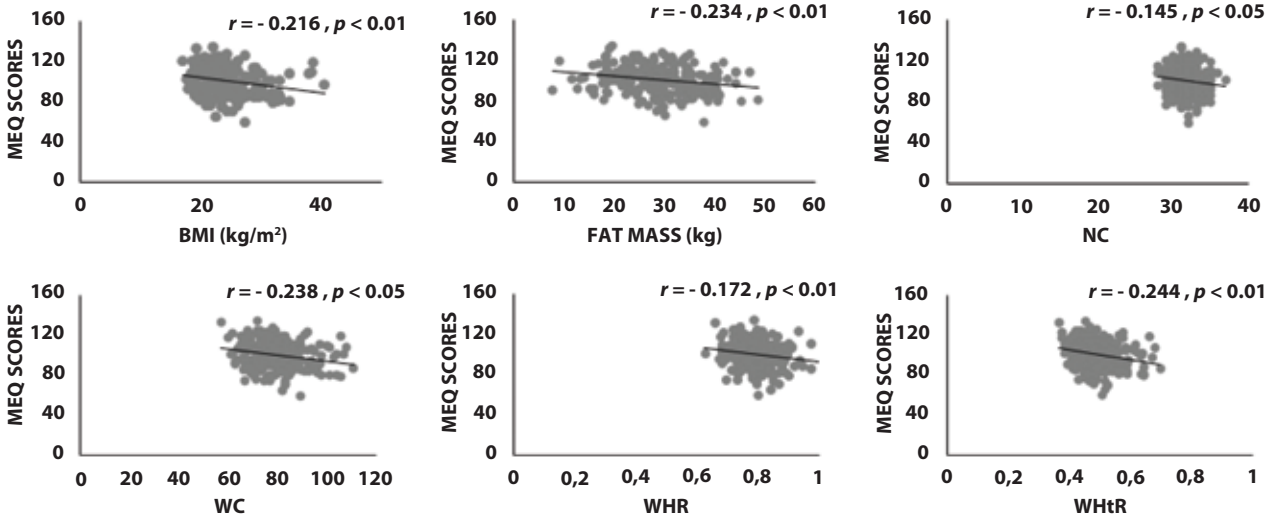

Figure 3. Correlations between MEQ scores and anthropometric measurements.

pandemic, altered body perception of participants with the effects of media and biological features such as female body hormones. Lockdown measures during the COVID-19 pandemic significantly were impacted the life routines of the world population (36,37). In addition to this, elevated psychological distress and financial difficulties may have negatively affected the eating behaviors during the COVID-19 pandemic (38). Moreover, social distancing, known as one of the main rules of the pandemic, likely increases communication via the internet, which raises exposure to social media and increases the risk of impaired eating habits (39). Thin-ideal and diet culture-related content on social media were reported as factors raising the risk of unhealthy relationships with food (40-43).

Experiments investigating menstrual cycle phases' effects on food consumption showed that food consumption patterns vary across the menstrual cycle (44-47). In addition, in several recent studies, it was determined that female reproductive hormones may

influence the symptoms of eating disorders (45-51). However, there no research has been done on factors that may have contributed to eating habits such as social media exposure, the menstrual cycle that affects the hormone levels of participants, and stress levels in this study. Hence, future studies are needed to investigate such factors that may affect the eating behaviors of participants.

The onset and maintenance of overweight and obesity have been associated with low levels of mindful eating (53,53). Similarly, our results were shown an inverse relationship between MEQ score and BMI ($p<0.01$). In other words, a higher MEQ score was associated with lower BMI or vice versa. In a recent study, similar to our result, an increase in BMI in women was associated with a decreased MEQ score (34). Moreover, fat mass, WHtR, WHR, WC and NC were greater in the participants with low MEQ scores than those with high scores ($p<0.05$). Recent studies stress the benefits of mindful eating since with this concept participants focus on the increasing awareness of hunger and satiety cues and self-monitoring (54-56). As a result of an increased level of mindful eating, it is emphasized that the body weights of participants associated with an elevated risk of obesity, may be decreased (57).

To conclude, there is a negative relationship between mindful eating and BMI. Additionally, there is a positive relationship between the tendency of disordered eating behavior and WHtR. These findings add to a growing body of literature on mindful eating, eating behavior disorders and their relationship with anthropometric measurements amongst young female subjects. This study has several limitations. Firstly, data collection was carried out during the COVID-19 pandemic. This may be a limitation for this study, as participants may have changed their food consumption habits during this period. Secondly, our sample predominantly comprised women who had a university or higher degree, which is not fully representative of the entire population of Famagusta. Therefore, this limits the generalizability of the present findings. Lastly, one of the limitations of the study is that the socioeconomic situation is not directly evaluated. However, education status was investigated as a clue to the socioeconomic status of participants (58,59).

The present findings might have important implications for understanding obesity and its relationship with disordered eating behaviors and mindful eating. In the future, it would be more beneficial to research a larger sample size and multi-centered for the validity and reliability of the data obtained. Moreover, it will be a fruitful research direction to the field if researchers do studies that examine factors social media exposure, the menstrual cycle, and stress levels that may have effects on nutritional behavior in future studies.

Conflicts of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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