Original Article

The Effect of Stress Management Training Provided to Obese Women on Eating Attitudes, Stress, Coping with Stress: A Randomized Controlled Trial

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Abstract
Background: Obesity, which is an important public healthcare issue, can affect women's physical, mental, social health, stress level, and coping negatively. The health professionals must help women cope with the problems they may experience as a result of obesity to reduce these negative effects.
Aim: The study was conducted to determine the effects of stress management training provided to obese women on eating attitudes, stress, and coping with stress.
Methodology: The sampling of the randomized controlled experimental study based on the pre-test and post-test model consisted of 70 women (experimental=35; control=35) with a Body Mass Index ≥30, who applied to a Community Health Center Obesity Unit in primary care in Turkey. The data were by using Personal Information Form, Perceived Stress Scale, Styles of Coping with Stress Scale, Dutch Eating Behavior Questionnaire, and height-weight measurements (Body Mass Index).
Results: Statistically significant differences were detected between the women in the experimental and control groups after the training, the Body Mass Index, between the self-confidence, optimistic and social support-seeking approach from the sub-dimensions of Styles of Coping with Stress Scale, and between the extrinsic and restrictive eating behaviors, which are the sub-dimensions of the Dutch Eating Behavior Questionnaire ($p<0.05$).
Conclusion: The training provided was found to be effective in reducing the Body Mass Index and extrinsic eating behaviors, increasing the restrictive eating behavior, and use of more positive ways in coping with stress.

Keywords: Eating attitude, obesity, stress, stress management training, women.

Introduction

Obesity is a complex and multidimensional disease that occurs with the interaction of genetic and environmental factors and affects life expectancy and health negatively (Daubenmier et al., 2011). An unhealthy diet, combined with a sedentary lifestyle, leads to a chronic excess of energy as one of the main risk factors in the etiology of obesity (Christaki et al., 2013; Kim & Kang, 2021). It was reported in 2016 that more than 1.9 billion adults aged 18 years and over were overweight and more than 650 million were obese in the world (Christaki et al., 2013; Czepczor-Bernat et al., 2021). Among whom 39% were overweight (40% of women) and 13% (15% of women) were obese (WHO 2021). According to the results of the Turkey Demographic and Health Questionnaire (2018), the prevalence of obesity in Turkey was reported to be 30% (TDHQ 2018).

Obesity is closely associated with some mental problems such as depression, anxiety, and stress as well as physical problems (Jones et al., 2021; Knol & Brantley, 2021; Koski & Naukkarinen, 2017; O'Reilly et al., 2014).

The negative emotions and exposure to chronic stress experienced trigger the consumption of fatty and sweet foods, and increase the prevalence of obesity significantly (Daubenmier et al., 2011; Sampaio et al., 2021). However, being obese can also affect an individual's self-confidence, body image perception, and social activity, and lead to deficiencies in problem-solving and coping skills (O'Reilly et al., 2014). Stress levels are higher in women, and women are more prone to obesity than men (Sampaio et al., 2021). Some studies in the literature show that stress is higher in obese women (Koski & Naukkarinen, 2017; Mouchacca et al., 2013). In a previous study, it was reported that obese people have higher stress-related eating behaviors than those who are at a healthy weight, and as stress-related eating behavior increases, coping resources decrease (Knol & Brantley, 2021).

There are some non-pharmacological approaches e.g. cognitive-behavioral therapies, progressive muscle relaxation techniques, and stress management programs in coping with obesity (Cayır & Aktürk, 2014; Christaki et al., 2013; Dutheil et al., 2019; Olateju et al., 2021; Suojanen et al., 2020). The relationship between obesity, stress and coping is so strong that it is important to address the individual's mood and implement stress management programs for sustainable weight loss because the mental health and stress management of individuals happen in front of the practices to be performed for the prevention of obesity (Czepczor-Bernat et al., 2021; Dutheil et al., 2019). Previous studies in the literature also show that stress management training provided reduces psychological stress (Bilge et al., 2015; Christaki et al., 2013; Daubenmier et al., 2011; Kim & Kang, 2021; Raja-Khan et al., 2017; Szczepańska-Gieracha et al., 2019; Xenaki et al., 2018).

Obesity might affect women's physical, mental and social health negatively because there is generally more pressure on women to be thin. It is considered that if women can cope positively with conditions such as stress and anxiety they may face, mental problems which may emerge as a result of obesity can be avoided and the risk of harm can be minimized. The findings of the present study can be a guide in strengthening the coping of women with obesity problems with training and counseling and reducing the stress factor. In this context, the study was conducted to determine the effect of stress management training provided to obese women on eating attitudes, stress, and coping with stress.

Hypotheses of the Study

H_1: There is a significant difference between the Perceived Stress Scale pre- and post-test scores of the experimental and control groups.

H_2: There is a significant difference between the pre-test and post-test scores of the Experimental and Control Groups on the Styles of Coping with Stress Scale.

H_3: There is a significant difference between the Dutch Eating Behavior Questionnaire pre- and post-test scores of the experimental and control groups.

Methodology

Design: The study has a randomized controlled experimental study design based on the pre-test and post-test model.

Participants: The population of the study consisted of women applying to a Community Health Center (CHC) Obesity Unit in the primary care Anatolia in the Central Region of Turkey. Women who lived in the city center, BMI ≥30, having no perception and communication problems, women who volunteered to participate in the study were included in the study. According to the G*Power Analysis, the sample size was determined as 42 women for the experimental group and 42 women for the control group for $\alpha = 0.05$, $p = 0.90$ power, and an acceptable difference of 0.02 (Bozan et al., 2011). The women who met the inclusion criteria and applied to the CHC Obesity Unit were included in the study by selecting one by one for the experiment and the control groups, respectively, using the simple random sampling method. Since 4 people from the experimental group and 5 people from the control group quit their jobs, 3 people from the experimental group could not be reached and 2 people from the control group moved out of the city, the study was completed with 70 women (experimental: 35; control: 35). According to the Post-hoc Power Analysis that was performed at the end of the study, the effect size of 0.02 and a margin of error of $\alpha = 0.05$ were found to be $1-\beta = 0.05$, and

sufficient power was achieved. The study data were collected between January 01, 2019, and October 30, 2019.

Procedure: The women who met the study criteria who applied to the CHC Obesity Unit were met in the first interview, the purpose of the study was explained, and written informed consent was obtained from the individuals who agreed to participate in the study. The BMI (kg/m^2) was calculated by measuring the height and weight of the women in the experimental and control groups. The women in the experimental and control group with BMI ≥30 were filled in by the researchers by using the Personal Information Form, Perceived Stress Scale (PSS), Styles of Coping with Stress Scale (SCSS), and Dutch Eating Behavior Survey (DEBS) with face-to-face interview method (pre-test). Then, the women in the experimental group were provided with stress management training to help cope with stress conditions (what stress and stressor are, what causes stress, and what causes stress, problems that emerge when stress cannot be coped with effectively, what the ways to cope with ineffectively and effectively are), how to use positive coping in conditions in case of stress and tension. The environment where training was provided in CHC Obesity Unit was made suitable in terms of heat, light, and noise. Stress management training was prepared in line with adult training principles in a quiet, calm, and separate room where individuals could express themselves comfortably. In terms of the reliability of the training, all training activities were performed by the same researcher, each woman was interviewed face-to-face, which lasted for 30-40 minutes. During the training, materials such as brochures, illustrated guides, and blackboards related to stress management, and training methods such as narration, question-answer, discussion, brainstorming, and problem-solving were used. Stress management training was not provided to the women in the control group. The women in the experimental and control group were invited to the CHC one month later, filled in the forms by using the face-to-face interview method, height-weight measurement, and BMI (post-test). Since women were informed about the purpose and benefits of the study beforehand, women participated in the training and filled out the questionnaires voluntarily. Filling out the forms took about 20-30 minutes and this time was not exceeded. Also, the standard care and practices applied in CHC were applied to the women in the experimental and control group. These standard care and practices consisted of blood pressure, pulse, and blood glucose measurements.

Data Collection Tools

Personal Information Form: The form included a total of 26 questions, 12 on the socio-demographic characteristics of women (e.g. age, occupation, employment status, marital status, training status), 11 on nutrition and obesity, 2 on stress management, and the rest on features such as height-weight and BMI.

Perceived Stress Scale (PSS): The scale was developed by Cohen et al. (1983). It was adapted into Turkish Society by conducting the validity and reliability study by Erci (2006). The scale consisted of 10 items, scored between 1-5 and the total score is calculated between 10-50. As the score increases, the stress level also increases. The test-retest correlation was found to be 0.88 in the validity and reliability study of the scale (Erci, 2006).

Styles of Coping with Stress Scale (SCSS): The scale that was developed by Folkman and Lazarus (1980) was adapted into Turkish by Hisli Sahin and Durak (1995). The scale has five sub-dimensions; "self-confident approach", "optimistic approach", "helpless approach", "submissive approach", and "social support seeking approach". The scale, which consists of a total of 30 items, is scored between 0-3. The scores of each sub-dimension are calculated separately, the total score is not calculated. In the evaluation, as the scores obtained from the dimensions of self-confidence, optimism, and seeking social support increase, coping with stress is deemed effective, and the increased scores obtained from the helpless approach and submissive approach dimension indicates that ineffective methods are used in coping with stress. The internal consistency coefficient was 0.80 for the self-confident approach, 0.68 for the optimistic approach, 0.73 for the helpless approach, 0.70 for the submissive approach, and 0.47 for the seeking social support approach in the validity and reliability study (Hisli Sahin & Durak, 1995).

Dutch Eating Behavior Survey (DEBS): The validity and reliability study of the

questionnaire that was developed by Van Strien et al., (1986) was conducted by Bozan et al., (2011). The questionnaire has a 5-point Likert type and consists of 33 items. It has three sub-dimensions. A high total score indicates negativity regarding eating behavior. The Cronbach Alpha Coefficient was found to be 0.97 for emotional eating behavior, 0.90 for extrinsic eating behavior, 0.91 for restricted eating behavior, and 0.94 for total score in the validity and reliability study (Bozan et al., 2011).

Statistical Analysis: The data of the study were evaluated with the SPSS 23 Program. Whether the data showed normal distribution or not was evaluated by the Kolmogorov-Smirnov test. Number and percentage distribution were used in the evaluation of some characteristics of socio-demographic, nutrition, and obesity, and comparisons between groups were made with the chi-square test. If the data showed normal distribution, t-test, mean and standard deviation were used in independent groups to compare the mean scores. The effect size was calculated with the Cohen's d index. The results were evaluated at an effect size and 95% confidence interval with a significance level of $p<0.05$.

Ethics: The study was registered at the ClinicalTrials.gov (NCT05281822). The University Ethics Committee Approval for Non-Interventional Clinical Study (decision no: 2018-03/18; date: 26-03-2018) and written permission were received from the institution where the study was conducted. The study was conducted in line with the principles of the Declaration of Helsinki.

Results

Socio-descriptive characteristics

The mean age of the women was 42.17±11.04 in the experimental group, and the mean age of the women was 40.65±11.68 in the control group. The socio-demographic characteristics of the women in the experimental and control group (age, employment status, training, marital status, family type, income status, smoking status, and the reason for applying to the obesity unit) were similar and no statistically significant differences were detected between the groups ($p>0.05$; Table 1).

The nutritional and obesity-related characteristics

The nutritional and obesity-related characteristics of the women in the experimental and control group (obesity duration, number of main meals per day, skipping meals, regular breakfast, food eaten between meals) were similar, and there were no statistically significant differences between them ($p>0.05$).

Results related BMI, PSS, SCSS and DEBS

As seen in Table 2, statistically significant differences were detected between the post-training BMI score averages of the women in the experimental and control groups ($p<0.05$), and the mean BMI scores decreased significantly after the training. While the effect size was 0.06 (0.08/1.22) at the 95% confidence interval at the pre-test, it was found to be 0.81 (1.26/1.55) at the post-test.

Although decreased perceived stress scores were detected in the obese women in the experimental group in the post-test post-training, the difference was not found to be statistically significant ($p>0.05$, Table 3).

Statistically significant differences were detected after the training between the women in the experimental group and the women in the control group, in terms of the mean scores of self-confident, optimistic, and seeking social support approaches, which are the sub-dimensions of SCSS ($p<0.05$). It was found after the training that the post-test mean scores of the women in the experimental group increased and they used more positive coping styles. The self-confident approaches which are the sub-dimensions of SCSS while the effect size was –0.03 (–0.14/3.60) at the 95% confidence interval at the pre-test, it was found to be –0.59 (–2.06/3.47) at the post-test. In addition optimistic approach –0.08 (–0.22/2.62) at the pre-test, –0.061 (–1.68 / 2.72) at the post-test; approach to seeking social support –0.69 (–1.38/1.96) at the pre-test, –0.76 (–1.51/1.97) it was found to be at the post-test (Table 3).

As seen in Table 4, statistically significant differences were detected between the women in the experimental and control group in terms of extrinsic eating and restrictive eating

behavior, which are the sub-dimensions of DEBS, in the post-test post-training ($p<0.05$). Although decreases were detected in extrinsic eating behavior in women in the experimental group after the training, it was found that there were increases in restrictive eating behavior. The extrinsic eating behavior which are the sub-dimensions of DEBS while the effect size was 0.52 (4.06/7.79) at the 95% confidence interval at the pre-test, it was found to be 0.70 (4.80/6.83) at the post-test. In addition restrictive eating behavior 0.15 (1.11/7.13) at the pre-test, –0.60 (–4.35/7.14) it was found to be at the post-test.

Table 1. Socio-descriptive characteristics

Characteristics		Experimental (n=35)	Control (n=35)	Test (χ^2 / *p*)
	Average age (min-max)	42.17±11.04 (23-66)	40.65±11.68 (25-60)	
		n (%)	n (%)	
Age groups	23-35 age	13 (37.1)	14 (40.0)	0.060 / 0.806
	36 age and ↑	22 (62.9)	21 (60.0)	
Work status	Working	8 (22.9)	10 (28.6)	0.299 / 0.584
	Not working	27 (77.1)	25 (71.4)	
Education	Primary education	21 (60.0)	15 (42.9)	2.059 / 0.116
	High school and ↑	14 (40.0)	20 (57.1)	
Marital status	Married	30 (85.7)	28 (80.0)	0.402 / 0.526
	Single	5 (14.3)	7 (20.0)	
Family type	Nuclear	30 (85.7)	26 (74.3)	1.429 / 0.232
	Extended	5 (14.3)	9 (25.7)	
Income status	Income less than expense	10 (28.6)	7 (20.0)	0.887 / 0.642
	Income and expense equal	20 (57.1)	21 (60.0)	
	Income more than expense	5 (14.3)	7 (20.0)	
Smoking	Yes	14 (40.0)	13 (37.1)	0.060 / 0.806
	No	21 (60.0)	22 (62.9)	
Reason for applying	Don't want to lose weight	29 (82.9)	27 (77.1)	0.357 / 0.550
	Having to lose weight	6 (17.1)	8 (22.9)	

χ^2 = chi-square test

Table 2. Mean Body Mass Index scores of the women in the experimental and control groups

BMI (kg / m²)	Experimental (n=35) X±SD	Control (n=35) X±SD	Test (t / p)	Effect Size (%95 CI)
Pre-test	31.82±1.22	31.90±1.23	–0.279 /0.782	0.06 (0.08 / 1.22)
Post-test	30.51±1.31	31.77±1.76	–3.668 / 0.001*	0.81 (1.26 / 1.55)

**p < 0.05; t = t test in independent groups; BMI = Body Mass Index; Effect Size = Cohen's d index*

Table 3. The mean scores of the women in the experimental and control groups Perceived Stress Scale and the Scale of Coping with Stress sub-dimensions

Scales	Experimental (n=35) X±SD	Control (n=35) X±SD	Test *(t / p)*	Effect Size (%95 CI)
PSS				
Pre-test	32.00±3.81	31.20±3.41	0.836 / 0.409	–0.21 (–0.83 / 3.79)
Post-test	31.94±2.85	30.37±4.14	1.787 / 0.083	–0.44 (–1.57 / 3.55
SCSS sub-dimensions				
Self-confident approach				
Pre-test	13.85±3.08	13.71±4.07	0.174 / 0.863	–0.03 (–0.14 / 3.60)
Post-test	15.34±2.79	13.28±4.04	3.089 / 0.004*	–0.59(–2.06 / 3.47)
Optimistic approach				
Pre-test	9.22±2.05	9.00±3.09	0.346 / 0.731	–0.08 (–0.22 / 2.62)
Post-test	10.42±1.94	8.74±3.33	2.379 / 0.023*	–0.061 (–1.68 / 2.72)
Helpless approach				
Pre-test	10.20±3.30	12.34±4.97	–1.859 / 0.072	0.50 (2.14 / 4.21)
Post-test	10.54±3.20	11.54±3.37	–1.159 / 0.255	0.30 (1.00 / 3.28)
Submissive approach				
Pre-test	7.65±2.47	7.31±3.52	0.473 / 0.639	–0.11 (–0.34 / 3.04)
Post-test	7.97±2.13	7.62±3.17	0.530 / 0.600	–0.12 (–0.35 / 2.70)
Approach to seeking social support				
Pre-test	8.05±1.76	6.68±2.15	2.669 / 0.012*	–0.69 (–1.38 / 1.96)
Post-test	8.20±1.74	6.69±2.19	2.973 / 0.005*	–0.76 (–1.51 / 1.97)

**p < 0.05; t = t test in independent groups; PSS = Perceived Stress Scale; SCSS = Styles of Coping with Stress Scale; Effect Size = Cohen's d index*

Table 4. Mean Dutch Eating Behavior Questionnaire scores of women in the experimental and control groups

DEBS	Experimental (n=35) X±SD	Control (n=35) X±SD	Test *(t / p)*	Effect Size (%95 CI)
Emotional eating behavior				
Pre-test	27.22±10.97	28.14±12.45	–0.349 / 0.729	0.07 (0.92 / 11.73)
Post-test	25.14±9.47	29.22±11.88	–1.587 / 0.122	0.37 (4.08 / 10.74)
Extrinsic eating behavior				
Pre-test	27.28±8.06	31.34±7.52	–2.311 / 0.027*	0.52 (4.06 / 7.79)
Post-test	25.48±6.65	30.28±7.01	–3.082 / 0.004*	0.70 (4.80 / 6.83)
Restrictive eating behavior				
Pre-test	27.60±8.15	28.71±5.94	–0.684 / 0.499	0.15 (1.11 / 7.13)
Post-test	33.00±6.63	28.65±7.62	2.693 / 0.011*	–0.60 (–4.35 / 7.14)
Total				
Pre-test	82.11±14.54	88.20±15.67	–1.797 / 0.081	0.40 (6.09 / 15.11)
Post-test	83.62±12.43	88.17±15.64	–1.449 / 0.157	0.32 (4.55 / 14.12)

**p < 0.05; t = t-test in independent groups; DEBS = Dutch Eating Behavior Questionnaire; Effect Size = Cohen's d index*

Discussion

Although there was a decreased perceived stress scores of the women who received stress management training, it was found that the difference was statistically insignificant when compared with the group that did not receive the training. According to this finding, stress management training was not effective on perceived stress levels and our H_1 hypothesis was rejected. It was reported in

previous studies that stress is a condition that causes both mental and physical diseases, does not kill the person, but poses a danger (Bilge et al., 2015). It is considered that stress management training does not affect perceived stress because the effects of stress last for a long time and the effects of stress continue until the stressors disappear. In a previous study, a stress management program was applied to obese and overweight women for eight weeks, and no significant differences were detected in perceived stress levels, similar to our study finding (Christaki et al., 2013). Also, a systematic review study reported that there were no differences in stress between the post-intervention groups (Jones et al., 2021). However, unlike our study findings, there are studies in the literature showing significant reductions in post-training stress levels (Bilge et al., 2015; Nho & Chae, 2021; Raja-Khan et al., 2017; Sampaio et al., 2021; Szczepańska-Gieracha et al., 2019; Webber et al., 2016; Xenaki et al., 2018). The reason for these differences is explained by the characteristics of the sample group and the differences in the interventions.

It was found after stress management training that obese women used more positive stress coping styles in terms of being self-confident, optimistic, and seeking social support. This shows that the training provided achieved its purpose and our H_2 hypothesis was supported. Stress-related eating behavior can reduce individuals' coping resources (Knol & Brantley, 2021). A previous study revealed that obese women tend to solve their problems actively (Koski & Naukkarinen, 2017). Similar to our finding, it was determined that the stress sources of the group who lost weight decreased and they coped with stress better. It was determined in the same study that all individuals who lost weight had decreased emotionally focused coping, and those who lost 20 kg or more had increased problem-focused coping (Ryden et al., 2003). For this reason, in the present study, it was considered that the reason for the positive coping of women after the training might be the significant decrease in their BMI scores. Also, the detection of a significant increase in the social support levels of the intervention group after an eight-week stress management program that was conducted by Xenaki et al., (2018) supports our study findings.

In the present study, the BMI levels of the women who received stress management training were found to be lower than those who did not. In this respect, stress management training was effective in decreasing BMI scores. In a study, decreased BMI of women after a therapeutic program in which 60 minutes of health-promoting training and psycho training were used twice a week was similar to our study (Szczepańska-Gieracha et al., 2019). Similarly, in the study of Christaki et al., (2013) a stress management program was applied to obese and overweight women for eight weeks. At the end of the procedure, a significant decrease was detected in weight loss compared to the control group (4.44 kg in women in the intervention group and 1.38 kg in women in the control group). Also, other study findings are supporting our findings in the literature (Cayır & Aktürk, 2014; Daubenmieret al., 2011; Kim & Kang, 2021; Mazloomy-Mahmoodabad et al., 2017; Nho & Chae, 2021; Paltoglou et al., 2021; Webber et al., 2016; Xenaki et al., 2018). However, unlike our study findings, there is also a study in which no statistically significant decreases were observed in BMI two months after the 15-day web-based psycho training intervention for women (Czepczor-Bernat et al., 2021). The reason for this was explained by the different characteristics of the intervention provided and the women included in the sample group. The study of Kim and Kang (2021) emphasized that various psychological variables must be considered when planning and implementing a weight control program. For this reason, our findings on weight loss after stress management training must be considered in healthcare practices.

After stress management training, a decrease was detected in the extrinsic eating behavior of women, and an increase was detected in restrictive eating behavior. According to this finding obtained with extrinsic eating behavior, our H_3 hypothesis was accepted. In this case, stress management training reduced the effect of extrinsic factors on eating. In the study of Guzey (2014), in which nutrition training was provided to obese women, it was found that the individuals' extrinsic eating levels were high at the beginning, and there was a decrease in extrinsic eating behavior

after a 12-week follow-up, which supports our study finding. In another study, the decreased extrinsic eating behaviors in obese women after a four-month mindfulness intervention was similar to our finding (Daubenmieret al., 2011). Also, a review study concluded that mindfulness-based interventions were effective in improving extrinsic eating behavior (O'Reilly et al., 2014). However, in the study of Christaki et al., (2013) unlike our findings, no significant differences were detected in the extrinsic eating behavior of women after the stress management program. The reason for this difference was explained by the different characteristics of the obese women included in the sample groups.

The decreased extrinsic eating behavior after coping training may have driven women to increase restrictive eating behavior as a driving force. People with high extrinsic eating behavior may feel the desire to overeat as they are affected by the presence of the food, smell, or appearance of the food, even when they do not have the thought of eating (Van Strien et al., 2009). In the study of Christaki et al., (2013), it was found that the group in which the stress management program was applied had a higher level of restricted eating behavior after the intervention when compared to the control group. The result of another web-based psycho-training intervention study reported a significant increase in mindful eating and a significant decrease in uncontrolled eating (Czepczor-Bernat et al., 2021). In the studies of Sampaio et al. (2021), in which healing meditation was applied to obese women, a decrease was detected in extrinsic eating behaviors and an increase was detected in restrictive eating behaviors after eight weeks, which is consistent with our finding.

Conclusion: The stress management training was effective in decreasing the BMI scores of obese women, as well as in decreasing the extrinsic eating behavior and increasing the restrictive eating behavior. Also women was us more positive stress coping styles. In line with these results, it is recommended to provide training to obese women in coping with stress, support positive coping, to support in their regular applications to primary health care institutions and to perform regular follow-ups.

Limitations: The present study had some limitations. Firstly, the study was conducted with women. For this reason, the findings only cover obese women, and the results cannot be generalized to all women. Another limitation was that the study was conducted in a single center.

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