Psikiyatride Güncel Yaklaşımlar-Current Approaches in Psychiatry 2021; 13(Suppl 1):311-323
Doi: 10.18863/pgy.998530

RESEARCH

Multidisciplinary Approach to Obesity: Effects on Healthy - Permanent Weight Loss and Psychological Symptoms

Obeziteye Multidisipliner Yaklaşım: Sağlıklı - Kalıcı Kilo Verme ve Psikolojik Belirtiler Üzerine Etkileri

Dilek Sayık [1], Ahmet Ak [1], Ezgi Dinibütün Öğrünç [1], Sevilay Süreyya Ermiş [1], Ahmet Musmul [2]

Abstract

Obese individuals are at increased risk for many physical and psychological diseases compared to normal-weight individuals. This study aims to determine the effectiveness of the multidisciplinary approach applied to obese patients in an Obesity Center on healthy - permanent weight loss and psychological symptoms. This cross-sectional study was conducted with 50 obese individuals who completed the 12-month (6 modules) Obesity Center Training Program (OCTP). The mean age of the participants was 47.36 ± 12.88, and 96.0% (n = 48) were women. The Body Mass Index (BMI) of the participants with an education level of primary and secondary school was higher. The metabolic age, body weight, BMI, body fat mass, and lean tissue mass of the participants decreased significantly after the 12-month multidisciplinary program OCTP. Concurrently, the participants' mean Beck depression scores decreased significantly from 18.68 ± 7.94 (moderate depression) to 10.56 ± 5.60 (mild depression). There was a highly positive correlation between the depression level (10.56 ± 5.60) and the BMI value of the participants at the end of the program (34.48 ± 4.86). The multidisciplinary approach adopted in the fight against obesity is effective in permanent and healthy weight loss in obese individuals and reduces psychological symptoms. It is crucial that obese individuals are supported by health professionals in the weight loss process.

Keywords: Obesity, obesity center, training program, weight loss, multidisciplinary approach

Öz

Obez bireyler normal kilolu olan bireylere göre fiziksel ve psikolojik hastalıklar yönünden daha fazla risk taşıyabilmektedir. Bu çalışma, obez hastalara Obezite Merkezinde uygulanan multidisipliner yaklaşımın sağlıklı - kalıcı kilo verme ve psikolojik belirtilere etkisinin belirlenmesi amacıyla yapılmıştır. Kesitsel tipte olan bu araştırma 12 aylık (6 modül) Obezite Merkezi Eğitim Programını (OMEP) tamamlamış 50 obez birey ile yapılmıştır. Katılımcıların yaş ortalaması 47,36±12,88 ve %96,0'ı (n=48) kadındır. İlkokul ve ortaokul mezunu olan katılımcıların Beden Kitle İndeksi (BKİ) daha yüksektir. Katılımcıların 12 aylık multidispliner yaklaşımlı OMEP sonrasında metabolizma yaşı, vücut ağırlığı, BKİ, vücut yağ kitlesi ağırlığı ve yağsız doku kitlesi ağırlığının anlamlı olarak azaldığı saptanmıştır. Katılımcıların BECK Depresyon ortalamasının 18,68±7,94'ten (orta derece depresyon) 10,56±5,60'a (hafif derecede depresyon) anlamlı olarak düştüğü belirlenmiştir. Katılımcıların uygulama sonrasındaki depresyon düzeyi (10,56±5,60) ile modül sonu BKİ değeri (34,48±4,86) arasında ileri düzeyde pozitif pozitif yönde ilişki saptanmıştır. Obezite ile mücadele için obez bireylere uygulanan multidisipliner yaklaşımın kalıcı ve sağlıklı kilo vermede etkili olduğu ve psikolojik semptomları azalttığı görülmektedir. Obez bireylerin kilo verme sürecinde sağlık profesyonelleri tarafından desteklenmeleri önemlidir.

Anahtar sözcükler: Obezite, obezite merkezi, eğitim programı, kilo verme, multidisipliner yaklaşım

[1] Eskişehir City Hospital, Eskişehir, Turkey
[2] Eskişehir Osmangazi University, Eskişehir, Turkey

✉ Dilek Sayık, Eskişehir City Hospital, Education Department, Eskişehir, Turkey
dileksayik@gmail.com | 0000-0001-9614-0363

Received: 22.09.2021 | Accepted: 12.11.2021 | Published online: 27.12.2021

OBESITY is excessive or abnormal fat accumulation in the body due to the imbalance between energy intake and expenditure (Bray et al. 2016, Ural et al. 2018, Blüher 2020). Body mass index (BMI) is one of the commonly used diagnostic criteria for determining obesity. BMI is calculated by dividing body weight (kg) by height (m) squared. A BMI of 18.5 to 24.9 indicates "normal weight"; 25.0 to 29.9 "overweight"; 30.0 and above indicates "obesity" (WHO 2016, Ministry of Health 2021). The World Health Organization reported that the prevalence of obesity (BMI ≥ 30 kg/m2) has almost tripled in the last 50 years. The prevalence of obesity has quadrupled from 4% (in 1975) to 18% (in 2016), particularly among the young population aged 5-19 years (WHO 2016). The rate of obese individuals aged 15 and over in Turkey has increased from 19.6% (2016) to 21.1% (2019) (TUIK 2019). Obesity has become a significant health problem affecting individuals of all ages globally in recent years (Byrd et al. 2018, Lanigan et al. 2019, TUIK 2019, Blüher 2020).

Many biological, psychological, social, and environmental factors play a role in the etiology of obesity (Kadouh and Acosta 2017, Aggarwal and Jain 2018, Byrd et al. 2018), and the extent to which these factors affect the weight of the individual is not known precisely (Oguz et al. 2016). However, it is possible to diagnose the physical and psychological problems associated with obesity. The literature points out that obese individuals are at increased risk for physical and psychological diseases compared to normal-weight individuals (Sharma et al. 2017, Dobner and Kaser 2018, Ozden and Atabey 2019, Daly et al. 2019, Yesil et al. 2019). For this reason, it is critical for obese individuals to lose excess weight that threatens their health and maintain their healthy weight.

To lose weight, it is necessary to create an energy deficit in the body. Creating an energy deficit can be more difficult, especially for overweight and obese individuals. This is because multiple factors play a role in the development of obesity and weight gain (Kadouh and Acosta 2017, Aggarwal and Jain 2018). Solely exercising or dieting may not be effective for long-term weight loss (Ertem 2017), and this may lead individuals to despair. The permanent weight loss process and adherence to treatment are even more difficult for obese individuals, especially those with psychological disorders (Nigatu et al. 2017). For overweight and obese individuals to lose weight healthily and permanently, it is necessary to understand and analyze the factors contributing to the development of obesity, to support them bio-psycho-socially, and to adopt a multidisciplinary approach (Ertem 2017, Danismaz et al. 2020). Health professionals have substantial responsibilities in the systematic and effective functioning of this multidisciplinary program. The multidisciplinary program can include a team of obesity physicians and branch physicians, dieticians, psychologists, nurses, physiotherapists, and secretaries. Obese individuals are supported by training and individual consultations with all team members.

As a contribution to the literature, in this study, it was determined that a multidisciplinary approach to healthy and permanent weight loss applied to obese individuals for 12 months significantly reduced the level of depression and allowed weight loss. This study aims to determine the effectiveness of the multidisciplinary approach applied to obese patients in an Obesity Center on healthy - permanent weight loss and psychological symptoms. Research hypothesis were:The multidisciplinary approach applied to obese individuals in an obesity center is effective on healthy and

permanent weight loss, and The multidisciplinary approach applied to obese individuals in the obesity center reduces the level of depression.

Method

The design of the study is descriptive and cross-sectional. The study was conducted in the Obesity Center of the city hospital in Eskisehir, Turkey, between January 1, 2019 - August 30, 2020. In the Obesity Center Training Program, the practices were carried out by the coordinator, obesity physician, and branch physicians, dieticians, psychologists, nurses and physiotherapists (Table 1).

Sample

Sampling was not used in this study. The study comprised 50 obese individuals who completed the 12-month (6 modules) Obesity Center Training Program (OCTP) between January 1, 2019, and August 30, 2020. The power analysis performed at the end of the study (PASS 11 version 11.0.10) was based on the "Beck Depression Scale" used in this study, and in the pre-post test comparisons of this scale, paired means power analysis was used with a minimum power of 99% and an Alpha margin of error of 0.05. It was determined that 18 participants should be included in the sample.
Obese individuals who met the inclusion criteria and agreed to participate were included in the study. Inclusion criteria for the study were; being obese with a body mass index (BMI) of 30 and above, being 18 years of age or older, speaking Turkish, being literate, completing the 12-month module of OCTP, agreeing to participate in the study.

Procedure

The data of the participants were collected by the researchers through face-to-face interviews. At the beginning of the survey, the participants were informed about the study, and their consent was obtained. Before starting the research, ethical committee permissions (dated: 10/02/2020 and numbered: 25403353-050.99-E.17709 / 2020-11) from Eskisehir Osmangazi University, and institutional permissions from Eskisehir Provincial Health Directorate (dated: 24/06/2020 and numbered: 52167207-604.02-E.1067) were obtained. The study was carried out with voluntary participants that gave consent.

The Obesity Center Training Program (OCTP)

OCTP consists of 6 modules and takes 12 months in total. Figure 1 shows the content of the obesity center training program. The OCTP includes a coordinator, obesity physicians, and branch physicians, dieticians, psychologists, nurses, physiotherapists, and secretaries. All team members conduct special training and individual interviews within the module. Obese individuals enrolled in the program participate in the training and individual/group interviews/therapies/physical activity programs for 12 months and undergo health screening at regular intervals. In addition, they record "daily food consumption-stress level-activity" from the first day of the program, and this record is evaluated together with the team.

Obesity Center Training Content

What is obesity, its situation in the world and Turkey, detection of obesity, causes and effects, associated health problems, eating disorders, sleep quality and problems, eating habits and its relationship with diseases/obesity, vitamin deficiency causes and effects, the relationship between psychology and obesity, cognitive behavioral approach to obesity, providing motivation, healthy ways of coping with negative emotions and thoughts, healthy and balanced diet, creating balanced menus, the relationship between eating habits and obesity, food consumption, stress and activity recording, its causes and treatment, weight loss methods frequently encountered in the media and social media, calculating our calorie needs, calculating food calories, methods of maintaining the target weight, breathing and relaxation exercises, activity in a healthy life and its effects on the body.

Table 1. Content of the Obesity Center Training Program

Module Name	Module Duration	Module Content	Purpose
Module 1	2 weeks	Data on obese individuals and their body composition measurements are collected one-to-one by the multidisciplinary team.	Data collection
Module 2	2 weeks	Health screening and consultation processes are conducted. Body composition measurements are not taken.	Health Screening
Module 3	2 weeks	Participant's "daily food consumption-stress level-activity record" is evaluated. Personal support programs and group courses are planned. Training is provided by the multidisciplinary team every day, individual interviews/therapy and physical activity are organized once a week. Body composition measurements are taken.	Raising awareness about obesity
Module 4	8 weeks	The dietitian creates a customized healthy and balanced nutrition program. An individual interview/therapy/training is organized every 2 weeks by the multidisciplinary team. Physical activity is organized by the physiotherapist once a week. Body composition measurements are taken.	Creating behavior change
Module 5	20 weeks	An individual interview/therapy/physical activity/training is organized every 2 weeks by the multidisciplinary team. The dietitian re-evaluates the nutrition program of the participants. Body composition measurements are taken.	Weight loss
Module 6	20 weeks	An individual interview/therapy/physical activity/training is organized every 2 weeks by the multidisciplinary team. The dietitian re-evaluates the nutrition program of the participants. Body composition measurements are taken at the beginning and end of the module.	Weight loss and maintenance

Measures

Data collection forms were "Individual Identification Form", "Obesity Center Body Measurement Values Registration Form" and "Beck Depression Inventory".

The individual identification form

This form was prepared by the researchers in line with the literature (Bray et al. 2016, Ural et al. 2018, Lanigan et al. 2019, Yesil et al. 2019, Blüher 2020). The form includes questions about the individual's socio-demographic characteristics, presence of chronic disease, and previous weight information. These questions are on age (year), gender (male, female), marital status (single, married, divorced), the status of having children (yes, no), occupation and previous weight information. The individuals were asked

whether they had a chronic and/or psychological disease, and they were asked to mark "Yes" or "No" and then the comparisons were made according to the answers given by the individuals.

Obesity Center Body Measurement Values Registration Form

This form was prepared by the researchers contains information about the individual's metabolic age, body weight (kg), body fat mass, and lean tissue mass measured at the beginning of OCTP and after each module.

Beck Depression Inventory

It is routinely applied by the center to patients enrolled in OCTP. BDI, developed by Beck (1961), measures the emotional, cognitive, somatic, and motivational components perceived by individuals and provides information about the severity of depression (Beck 1961). The validity and reliability of the Turkish version of the inventory were assessed by Tegin (1980). This 21-item inventory is a 4-point Likert-type scale, and each item ranges from 0 to 3 points, giving a total score range of 0–63 (Beck 1961, Tegin 1980). The total score obtained is evaluated as 0-9 “absent/minimal depression”, 10-18 “mild depression”, 19-29 “moderate depression”, and 30-63 “severe depression” (Tegin 1980). Before starting the education program, the Beck Depression Inventory was administered to obese individuals. At the end of the training program (12 modules), a post-test was administered to obese individuals.

Statistical analysis

The continuous quantitative variables were expressed as mean and standard deviation, while the qualitative variables were expressed as n, median value, 25th and 75th percentiles. Kolmogorov-Smirnov and Shapiro-Wilk tests were used for normality tests of the variables. Independent Samples T-test (normally distributed, compared to two independent groups) and One Way Analysis of Variance tests (in comparison of normally distributed, three or more independent groups) were applied to the normally distributed independent variables. Paired Samples T-Test (in comparison of two normally distributed, dependent groups) Statistics was applied to the dependent variables. Mann-Whitney Rank Sum Test (non-normally distributed, compared to two independent groups) and Kruskal-Wallis One Way Analysis of Variance by Ranks Test (in comparison of non-normally distributed, three or more independent groups) were applied to the independent variables that did not show normal distribution, and Friedman Repeated Measures Analysis of Variance by Ranks test (in comparison of three or more dependent, non-normally distributed groups) was applied to the dependent variables. Spearman's Rho correlation test (continuous variables that are non-normally distributed) was used to determine the relationship between variables. Probability values of $p < .05$ were considered significant. All data analyzes were performed with IBM SPSS Statistics 21 software package.

Results

The ages of the participants ranged from 20 to 62, with a mean age of 47.36 ± 12.88 years, a mean height of 158.50 ± 7.15 cm, and a mean body weight of 116.21 ± 114.56 kg. All participants (n = 50) admitted to OCTP were obese (Module 1 BMI = 39.77 ±

5.05) and 96.0% (n = 48) were female, 86.0% (n = 43) were married, 14.0% (n = 7) were university graduates, 78.0% (n = 39) had children, and 96.0 (n = 48) had equal income and expenses. Table 2 compares the descriptive characteristics of the participants with their BMI (Module 1) and Beck Depression (Pre-Test) scores. A significant difference was found between the educational status of the participants and the BMI value in the 1st Module of OCTP (p= .015). Secondary school graduates had a higher BMI (Module 1) (43.51) than high school graduates (36.77).

Table 2. Comparison of participants' descriptive characteristics, BMI (Module 1) and Beck Depression (pre-test) scores (n=50)

Characteristics		n	%	BMI (Module 1)		p	Beck Depression Scale Pre- Test		p
Gender	Female	48	96.0	39.80	5.14	0.692 **	19.08	7.83	0.069 **
	Male	2	4.0	39.15	2.47		9.00	4.24	
Marital Status	Single/Divorced	7	14.0	39.87	4.90	0.955 *	19.57	8.92	0.752 *
	Married	43	86.0	39.75	5.13		18.53	7.88	
Educational Status	1 Primary school	21	42.0	40.72	3.70	0.015 *** 2-3	18.71	8.28	0.956 ***
	2 Middle School	7	14.0	43.51	5.28		17.14	6.18	
	3 High school	15	30.0	36.77	5.87		19.07	8.40	
	4 University and higher	7	14.0	39.61	3.52		19.29	8.96	
Working Status	Unemployed	45	90.0	39.88	5.05	0.639 **	18.89	7.70	0.722 **
	Employed	5	10.0	38.78	5.59		16.80	10.76	
Parental Status	No children	11	22.0	39.75	5.92	0.956 ****	18.91	8.72	0.661 ****
	Has 1 child	4	8.0	42.40	7.42		16.75	9.22	
	Has 2 children	24	48.0	39.48	5.24		19.96	8.19	
	Has 3 or more children	11	22.0	39.45	2.70		16.36	6.50	
Birth Weight	Low birth weight	8	16.0	38.97	4.79	0.128 ***	17.65	8.25	0.341 ***
	Normal birth weight	34	68.0	42.99	6.91		19.63	7.61	
	High birth weight	8	16.0	39.94	2.81		22.13	6.60	
Chronic Disease Presence	Yes	34	68.0	40.61	4.92	0.086 *	19.38	7.89	0.368 *
	No	16	32.0	37.98	5.00		17.19	8.10	
Having another overweight family member	No	7	14.0	38.49	2.10	0.474 *	18.71	5.25	0.990 *
	Yes	43	86.0	39.98	5.37		18.67	8.35	
Status of Using Weight Loss Medicine	Yes	5	10.0	43.72	6.20	0.155 **	18.80	7.19	0.974 **
	No	45	90.0	39.33	4.79		18.67	8.10	

* Independent Samples T-Test, ** Mann-Whitney Rank Sum Test, *** One Way Analysis of Variance, **** Kruskal-Wallis One Way Analysis of Variance on Ranks, Body mass index (BMI)

Table 3. Comparison of participants' several characteristics and BMI (Module 1) (n=50)

Variables	n	Spearman's rho r	p
		Before OCTP BMI value	
Age (year)	50	.227	.113
Preschool (5-6 years) weight (kg)	50	-.192	.183
Before high school (13-14 years) weight (kg)	50	.056	.700
After high school (17-18 years) weight (kg)	50	.204	.156
Weight at which they feel best (kg)	50	.473	.001
Age of dieting onset	50	-.130	.369
Beck Depression pre-test score	50	.048	.741
		After OCTP BMI value	
Age (year)		0.173	.229
Beck Depression post-test score	50	0.440	.001

r= Correlation Coefficient, Body mass index (BMI), Kilogram (kg), The Obesity Center Training Program (OCTP)

Table 4. Comparison of participants' Beck Depression Inventory pre-test and post-test scores (n=50)

Beck Depression Inventory Scores	Mean ± Std.	Median (25% - 75%)	p
Pre-test	18.68±7.94	18.00 (12.00-24.25)	<0.001
Post-test	10.56±5.60	9.00 (6.00-15.00)	

* Paired Samples T-Test Statistics

Table 5. Comparison of participants' body composition measurements by OCTP modules (n=50)

Variables		Modules	Measure day	Mean±Std.	Median (%25-%75)	p	Multiple Comparisons
Metabolic Age	1	At the beginning of Module 1	Day 1	57.78±12.80	60.00 (47.75-69.25)	<.001	1-4, 1-5, 1-6, 2-5, 2-6, 3-5, 3-6, 4-6, 3-5, 5-6
	2	At the beginning of Module 3	Day 30	57.64±12.80	59.50 (47.75-69.25)		
	3	At the beginning of Module 4	Day 44	57.40±12.80	59.50 (47.50-69.00)		
	4	At the beginning of Module 5	Day 100	56.62±12.87	59.00 (48.25-66.50)		
	5	At the beginning of Module 6	Day 240	55.62±12.98	58.00 (45.75-66.25)		
	6	At the end of Module 6	Day 380	54.06±13.29	56.00 (44.00-65.00)		
BMI 18.5-24.9 normal weight 25-29.9 overweight 30 and over obesity	1	At the beginning of Module 1	Day 1	39.77±5.05	39.35 (37.30-44.10)	<.001	1-3, 1-4, 1-5, 1-6, 2-3, 2-4, 2-5, 2-6, 3-5, 3-6, 4-6
	2	At the beginning of Module 3	Day 30	39.49±5.11	39.35 (36.68-43.63)		
	3	At the beginning of Module 4	Day 44	38.72±5.00	38.40 (36.15-42.43)		
	4	At the beginning of Module 5	Day 100	37.53±4.97	37.90 (33.95-41.43)		
	5	At the beginning of Module 6	Day 240	36.15±4.93	36.60 (32.88-39.85)		
	6	At the end of Module 6	Day 380	34.48±4.86	34.35 (31.60-37.65)		
Body Weight (kg)	1	At the beginning of Module 1	Day 1	116.21±114.56	97.00 (88.90-110.10)	<.001	1-4, 1-5, 1-6, 2-5, 2-6, 3-5, 3-6, 4-6, 3-5, 5-6
	2	At the beginning of Module 3	Day 30	94.95±23.35	93.30 (87.03-105.18)		
	3	At the beginning of Module 4	Day 44	97.41±15.98	93.05 (87.13-105.83)		
	4	At the beginning of Module 5	Day 100	94.43±15.62	91.60 (83.48-101.90)		
	5	At the beginning of Module 6	Day 240	90.98±15.28	89.35 (81.00-98.70)		
	6	At the end of Module 6	Day 380	87.13±15.12	84.75 (77.10-95.10)		
Body Fat Mass	1	At the beginning of Module 1	Day 1	41.65±10.27	40.15 (34.60-48.95)	<.001	1-4, 1-5, 1-6, 2-4, 2-5, 2-6, 3-4, 3-5, 3-6, 4-6, 5-6
	2	At the beginning of Module 3	Day 30	41.02±10.17	39.30 (34.78-46.65)		
	3	At the beginning of Module 4	Day 44	40.43±10.12	38.70 (33.48-45.08)		
	4	At the beginning of Module 5	Day 100	38.04±10.01	37.00 (30.88-43.25)		
	5	At the beginning of Module 6	Day 240	35.98±9.80	35.35 (28.38-41.40)		
	6	At the end of Module 6	Day 380	33.15±9.61	33.05 (26.95-39.25)		
Lean Tissue Mass	1	At the beginning of Module 1	Day 1	58.25±7.57	56.45 (53.50-62.60)	<.001	1-3, 1-4,
	2	At the beginning of Module 3	Day 30	57.90±7.53	56.75 (52.55-62.88)		

3	At the beginning of Module 4	Day 44	57.05±7.22	54.95 (51.90-61.10)	1-5, 1-6,
4	At the beginning of Module 5	Day 100	55.82±7.38	54.95 (51.08-60.33)	2-4, 2-5,
5	At the beginning of Module 6	Day 240	55.05±6.93	53.00 (50.43-58.65)	2-6, 3-5,
6	At the end of Module 6	Day 380	54.19±6.80	53.65 (49.00-57.93)	3-6, 4-6

Friedman Repeated Measures Analysis of Variance on Ranks, Median (25% - 75%), Body mass index (BMI), The Obesity Center Training Program (OCTP)

The mean body weight of the participants was 20.30 ± 3.90 kg in pre-school (5-6 years), 50.62 ± 11.12 kg before high school (13-14 years), and 59.82. ± 13.38 at the end of high school (17-18 years). The mean body weight at which they felt best was 72.84 ± 10.72 kg. Participants' age of starting dieting ranged from 15 to 64, with a mean age of 33.90 ± 14.23. The comparison of several characteristics of the participants with the BMI (Module 1) value is given in Table 3. A highly positive correlation was determined between the BMI (Module 1) and the weight (kg) at which the obese individual feels the best ($p = .001$ / $r = 0.473$). As the BMI value increased, the weight at which the participants felt best increased. There was no correlation between the participants' BMI (Module 1) value (39.77 ± 5.05) and BECK Depression pre-test scores (18.68 ± 7.94) ($p = .741$ / $r = 0.048$). A highly positive correlation was found between the participants' BMI (end of Module 6) (34.48 ± 4.86) and BECK Depression post-test scores (10.56 ± 5.60) after OCTP training ($p = .001$ / $r = 0.440$).

Table 4 compares the participants' Beck Depression scale pre-test - post-test scores. The participants' Beck Depression pre-test mean score was 18.68 ± 7.94 (moderate depression), and the post-test mean score was 10.56±5.60 (mild depression). Obese individuals completing all OCTP modules experienced a highly significant decrease in the severity of their depression ($p < .001$).

Table 5 shows the participants' body composition measurements recorded in the OCTP modules and their comparison by modules. As the modules advanced, statistically significant changes were observed in metabolic age, body weight, BMI, body fat mass, and lean tissue mass of the participants ($p < .001$). The body composition values decreased gradually in each module compared to the previous module.

Discussion

Fifty obese individuals, who were followed up and treated by a multidisciplinary team in the Obesity Center Training Program, lost weight significantly in 12 months, and their depression scores decreased significantly. There was no significant difference between the BMI (Module 1) of obese individuals before starting the OCTP training program and their gender. This is because the majority of the participants (96.0%, n = 46) were women. Similar to the results of this study, literature (Biffi and Raineri 2018, Ma et al. 2019, Celebioglu 2020, Danismaz et al. 2020, Sahin et al. 2021) shows that women apply to weight loss services more frequently. The reason for this may be that women are more willing to seek health.

There was a significant difference between the participants' educational status and BMI (Module 1) measured before the OCTP training program. BMI values of obese individuals who graduated from primary and secondary school were higher than those of obese individuals who graduated from high school and university. Similar to the results of this study, studies in the literature (Biffi and Raineri 2018, Ogden et al. 2018, Hsieh et al. 2020) also show that as the education level of obese individuals decreases, the BMI value increases. According to these findings, it can be inferred that one of the factors affecting obesity is the level of education. An increase in the level of education in

individuals may facilitate reading written materials such as healthy nutrition and physical health and raise awareness.

It was determined that 68.0% (n = 34) of the participants had a chronic disease, and 86.0% (n = 43) had other overweight family members. There was no significant relationship between these characteristics and the BMI (Module 1) of the participants before the OCTP training program. Sahin et al. (2021) reported that 54.7% of overweight and obese individuals who applied to the diabetes and obesity counseling unit of the wellness center had a chronic disease. Similarly literature (Sharma et al. 2017, Dobner and Kaser 2018, Daly et al. 2019, Ozden and Atabey 2019, Yesil et al. 2019, Danismaz et al. 2020) reveals that the chronic disease prevalence is high in obese individuals. In addition, studies (Yilmaz et al. 2018, Danismaz et al. 2020, Sahin et al. 2021) reported that most obese individuals (32.4% to 75.8%) had other overweight family members. This result shows that the presence of obese family members may also affect other members of the family.

The participants' mean BECK Depression pre-test score at the beginning of OCTP was 18.68 ± 7.94 (moderate depression), and there was no correlation with the initial BMI value (Module 1; 39.77 ± 5.05). Before starting the program, it was noted that as the BMI (Module 1) value of the participants increased, the body weight value at which they felt good also increased. After 12 months of OCTP, participants' BECK Depression post-test mean score decreased significantly to 10.56 ± 5.60 (mild depression). In addition, a highly positive correlation was determined between the BMI value (end of Module 6; 34.48 ± 4.86) and the BECK Depression post-test score after 12 months of OCTP. It is seen that depression levels decrease as obese individuals lose weight with the multidisciplinary approach program. Individuals living with obesity experience negative psychological, emotional, and social issues as well as physical difficulties. A qualitative study (Rand et al. 2017) showed that obese individuals experience social stigmatization by their family members, friends, and society due to their weight and feel a lack of psycho-social support in the health system. Management of obesity should not only focus on non-drug or pharmacological treatments for weight loss but also on mental health issues. Obese and overweight individuals deal with stressful situations such as discrimination and prejudice more than normal-weight individuals (Rand et al. 2017, Varela et al. 2020). One study (Varela et al. 2020) reported that overweight individuals scored significantly higher in passive coping strategies and unhealthy eating behaviors than normal-weight people. It is anticipated that passive coping strategies increase unhealthy eating behaviors leading to an increase in BMI value. Ma et al. (2019) applied a 12-month integrated collaborative care intervention for obesity aimed at improving both mood and weight and reported a significant decrease in depression symptom scores and a significant improvement in depressive symptoms in obese individuals after the 12-month intervention (Ma et al. 2019). Biffi and Raineri (2018) assessed the relationship between social capital and obesity by forming self-help and mutual aid groups from obese individuals and determined that the majority of individuals helped themselves by helping others in these help groups, and their willingness to deal actively with problems increased (Biffi and Raineri 2018). Similarly, in the OCTP study, obese individuals participated in group activities with a multidisciplinary team for 12 months and supported each other in the fight against obesity. These results support the development of obesity control programs applied to reach a healthy BMI value.

During the 12-month OCTP period, there was a statistically significant decreased in the participants' mean metabolic age from 57.78 ± 12.80 to 54.06 ± 13.29 (difference = 3.72), mean body weight (kg) from 116.21 ± 114.56 to 87.13 ± 15.12 (difference = 29.08 kg), and mean body fat mass (kg) from 41.65 ± 10.27 to 33.15 ± 9.61 (difference = 8.5 kg). Obesity negatively affects metabolic health (Stefan et al. 2021), and metabolic age and BMI value are positively correlated (Tiryaki 2017). Literature shows that interventions applied to overweight and obese individuals to combat obesity reduce the average body weight (kg) by 2.9-7.2 kg (Ma et al. 2013, Alp 2014, Kara 2014, Yoldag 2016, Horak et al. 2017, Tastan et al. 2020, Sahin et al. 2021, Wadden et al. 2021) and mean body fat mass (kg) by 1.9-4.7 kg (Alp 2014, Yoldag 2016, Sahin et al. 2021, Tastan et al. 2020). Another study (Megson et al. 2017) showed that individuals enrolled in obesity treatment lost weight simply by increasing the amount of food they eat for breakfast and at the same time reducing or keeping the frequency of eating constant. These results show that weight loss interventions applied by experts to overweight and obese individuals are effective on weight loss and can improve outcomes.

In the present study, the mean BMI value of the participants decreased statistically significantly from 39.77 ± 5.05 to 34.48 ± 4.86 (difference = 5.29) after the 12-month multidisciplinary OCTP program. In the study of Kara (2014), the diet program applied to obese individuals for 3 to 6 months decreased the average BMI value by 2.8. In Yoldag's (2016) study, a high protein diet applied to obese individuals for 6 weeks decreased the mean BMI value by 1.9, while a normal protein diet reduced it by 1.6. In studies applying only a diet program to obese individuals, the reduction in BMI value was between 1.6 and 2.8 (Kara 2014, Yoldag 2016). In a comprehensive group treatment for obesity in which diet and exercise were carried out together for 8 weeks, the average BMI value of obese women decreased by 1.4 at the end of the treatment (Horak et al. 2017). A study in which auricular acupuncture and NLP (Neuro-Linguistic Programming) were applied to obese individuals for three months (Tastan et al. 2020) reported that the mean BMI value decreased by 2.7 and 1.9, respectively. Such studies applied diets, acupuncture, and NLP to obese individuals to lose weight (Kara 2014, Yoldag 2016, Horak et al. 2017, Tastan et al. 2020) but did not provide psychological support. Participants should be supported to maintain the weight they lost after these short-term applications in the long term. In the study of Ma et al. (2013), the lifestyle intervention applied to obese and overweight individuals for 15 months under the leadership of a coach decreased the average BMI value by 2.2. Ma et al. (2019) also reported that a 12-month integrated collaborative care intervention aimed at improving both mood and weight in obese individuals reduced the mean BMI value by 0.8. In another study (Wadden et al. 2021), overweight and obese individuals in the intervention group received a low-calorie diet for the first 8 weeks, along with subcutaneous semaglutidine once a week, while the control group received a placebo. In addition, participants received intensive behavioral therapy with 30 consultation visits for 68 weeks (17 months). At the end of the study, the mean BMI value decreased in both groups, while the decrease was more significant in the semaglutide group. Reduction in BMI values of obese individuals in studies combining weight loss intervention and psychological support for 12 months or more (Ma et al. 2013, Ma et al. 2019, Wadden et al. 2021) was similar to that of studies focusing only on weight loss for less than 6 months (Kara 2014, Yoldag 2016, Horak et al. 2017, Tastan et al. 2020). The reason why BMI value did not decrease further in studies conducted with long-term

psychological support may be that individuals improved psychologically while losing weight and entered the phase of maintaining their weight. A systematic review of weight loss and weight loss maintenance interventions (LeBlanc et al. 2018) noted that behavioral weight loss interventions resulted in greater weight loss than pharmacotherapy. In addition, a positive correlation was reported between the increase in the duration of the behavioral intervention and weight loss. In this study, in which we applied OCTP to obese individuals for 12 months, the decrease in BMI value (difference=5.29) was almost two-fold greater than in other studies (Ma et al. 2013, Kara 2014, Yoldag 2016, Horak et al. 2017, Ma et al. 2019, Tastan et al. 2020, Wadden et al. 2021). The reasons for this may be that the health professionals in the OCTP team evaluated each obese individual separately and provided both individual and group support following the modules included in the program. The success of this OCTP study can also be related to the Obesity Center residing in a hospital environment, and the multidisciplinary approach adopted.

This study has some limitations. Only voluntary participants filled in the data collection form used in the study. In particular, individuals with worse depression levels may have been more willing to fill out the forms. Since the study is cross-sectional, it is not possible to determine a definite causal relationship between some characteristics of obese individuals and their depression levels during the Obesity Center Training Program.

Conclusion

Çalışma sonucunda obez bireylere sağlıklı ve kalıcı kilo vermede 12 ay boyunca uygulanan multidisipliner yaklaşımının anlamlı düzeyde depresyon düzeyini azalttığı ve kilo vermeyi sağladığı saptanmıştır. Önerimiz obez bireylerin fiziksel ve psikolojik sağlıklarının sağlık profesyonelleri tarafından daha yakından takip edilmesi ve kilo verme sürecinde gerekli multidisipliner desteğin sağlanmasıdır.

References

Aggarwal B, Jain V (2018) Obesity in children: definition, etiology and approach. Indian J Pediatr, 85:463-471.

Alp G (2014) Özel bir fizik tedavi merkezinde uygulanan obezite tedavisinin kilo verme üzerine etkisinin saptanması (Yüksek lisans tezi). Ankara, Başkent Üniversitesi.

Beck AT (1961) An inventory for measuring depression. Arch Gen Psychiatry, 4:561-71.

Biffi F, Raineri ML (2018) The social capital of obese persons: implication for selfhelp/mutual aid groups and social work practice. European Journal of Social Work, 21:530-545.

Blüher M (2020) Metabolically healthy obesity. Endocr Rev, 41(3):bnaa04.

Bray GA, Frühbeck G, Ryan DH, Wilding JP (2016) Management of obesity. Lancet, 387:1947-1956.

Byrd AS, Toth AT, Stanford FC (2018) Racial disparities in obesity treatment. Curr Obes Rep, 7:130-138.

Celebioglu N (2020) Buldan ilçesinde özel bir diyet merkezine başvuran kişilerin beslenme alışkanlıkları, fiziksel aktivite ve kilo verme amaçlı ürün kullanma durumları (Yüksek lisans tezi). Denizli, Pamukkale Üniversitesi.

Daly M, Sutin AR, Robinson E (2019) Perceived weight discrimination mediates the prospective association between obesity and physiological dysregulation: Evidence from a population-based cohort. Psychol Sci, 30:1030-1039.

Danismaz Sevin M, Kaya B, Zengin DB, Esenturk MU, Dogan S, Demir S et al. (2020) XXXL bedenler: obez bireylerin baş etme stratejilerinin bazı sosyodemografik değişkenler açısından incelenmesi. Toplum ve Sosyal Hizmet, 31:1029-1052.

Dobner J, Kaser S (2018). Body mass index and the risk of infection-from underweight to obesity. Clin Microbiol Infect, 24:24-28.

Ertem M (2017) Obezite epidemiyolojisi ve korunma. Klinik Tıp Bilimleri, 5:21-30.

Horák S, Sovová E, Pastucha D, Konečný P, Radová L, Calabová N et al. (2017) Comprehensive group therapy of obesity and its impact on selected anthropometric and postural parameters. Cent Eur J Public Health, 25:326-331.

Hsieh TH, Lee JJ, Yu EWR, Hu HY, Lin SY, Ho CY (2020) Association between obesity and education level among the elderly in Taipei, Taiwan between 2013 and 2015: a cross-sectional study. Sci Rep, 10:20285.

Kadouh HC, Acosta A (2017) Current paradigms in the etiology of obesity. Tech Gastrointest Endosc, 19:2-11.

Kara H (2014) Diyet yapan obez bireylerde leptin, ghrelin, nesfatin1 ve obestatin biyokimyasal parametreleri ile kilo verme arasındaki ilişki (Yüksek lisans tezi). Balıkesir, Balıkesir Üniversitesi.

Lanigan J, Tee L, Brandreth R (2019) Childhood obesity. Medicine, 47:190-194.

LeBlanc ES, Patnode CD, Webber EM, Webber EM, Redmond N, Rushkin M et al. (2018) Behavioral and pharmacotherapy weight loss interventions to prevent obesity-related morbidity and mortality in adults: updated evidence report and systematic review for the US Preventive Services Task Force. JAMA, 320:1172-1191.

Ma J, Yank V, Xiao L, Lavori PW, Wilson SR, Rosas LG et al. (2013) Translating the diabetes prevention program lifestyle intervention for weight loss into primary care: a randomized trial. JAMA Intern Med, 173:113-121.

Ma J, Rosas LG, Lv N, Xiao L, Snowden MB, Venditti EM et al. (2019) Effect of integrated behavioral weight loss treatment and problem-solving therapy on body mass index and depressive symptoms among patients with obesity and depression: the RAINBOW randomized clinical trial. JAMA, 321:869-879.

Megson M, Wing R, Leahey TM (2017) Effects of breakfast eating and eating frequency on body mass index and weight loss outcomes in adults enrolled in an obesity treatment program. J Behav Med, 40:595-601.

Ministry of Health (2021) Obezite nasıl hesaplanır?. https://hsgm.saglik.gov.tr/tr/obezite/obezite-nasil-saptanir.html (Accessed 25.05.2021).

Nigatu YT, Bültmann U, Schoevers RA, Penninx BW, Reijneveld SA (2017) Does obesity along with major depression or anxiety lead to higher use of health care and costs. Eur J Public Health, 27:965-971.

Ogden CL, Carroll MD, Fakhouri TH, Hales CM, Fryar CD, Li X et al. (2018) Prevalence of obesity among youths by household income and education level of head of household - United States 2011–2014. Morb Mortal Wkly Rep, 67:186–189.

Oguz G, Karabekiroglu A, Kocamanoglu B, Sungur MZ (2016) Obezite ve bilişsel davranışçı terapi. Psikiyatride Güncel Yaklaşımlar, 8:133-144.

Lütfioğlu M, Özden FO, Atabey V (2019) Obezite, oksidatif stres ve periodontal hastalık ilişkisi. Ege Üniversitesi Dişhekimliği Fakültesi Dergisi, 40:9-16.

Rand K, Vallis M, Aston M, Price S, Piccinini-Vallis H, Rehman L et al. (2017) "It is not the diet; it is the mental part we need help with." A multilevel analysis of psychological, emotional, and social well-being in obesity. Int J Qual Stud Health Well-being, 12:1306421.

Şahin CE, Sezerol MA, Atak M (2021) . Türkiye'deki birinci basamak sağlık merkezlerinde sağlıklı beslenme ve obezite hizmetlerinin değerlendirilmesi. Anadolu Kliniği Tıp Bilimleri Dergisi, 26:60-69.

Sharma N, Lee J, Youssef I, Salifu MO, McFarlane SI (2017) Obesity, cardiovascular disease and sleep disorders: insights into the rising epidemic. J Sleep Disord Ther, 6:260.

Stefan N, Birkenfeld AL, Schulze MB (2021) Global pandemics interconnected - obesity, impaired metabolic health and COVID-19. Nat Rev Endocrinol. 17:135-149.

Tastan K, Harmanci H, Sincan S, Oztekin C (2020) Aşırı kilolu ve obez bireylerde kulak akupunkturu ve NLP uygulamalarının kilo verme üzerine etkinliğinin karşılaştırılması: Konuralp Tıp Dergisi, 12:290-295.

Tegin B (1980) Cognitive impairments in depression: an analysis according to Beck's model (Doktora tezi). Ankara, Hacettepe Üniversitesi.

Tiryaki ST (2017) Obezite tanısı alan 55-70 yaş aralığındaki kadınlara ait vücut kompozisyon değerleri ile karaciğer enzim ve bilurubin düzeylerinin retrospektif analizi (Yüksek lisans tezi). Batman, Batman Üniversitesi.

TUIK (2019) Türkiye Sağlık Araştırması (2019) Obezite. Ankara, Türkiye İstatististik Kurumu.

Ural D, Kilickap M, Goksuluk H, Karaaslan D, Kayikcioglu M, Ozer N et al. (2018) Data on prevalence of obesity and waist circumference in Turkey: Systematic review, meta-analysis and meta-regression of epidemiological studies on cardiovascular risk factors. Turk Kardiyol Dern Ars, 46:577-590.

Varela C, Andrés A, Saldaña C (2020) The behavioral pathway model to overweight and obesity: coping strategies, eating behaviors and body mass index. Eat Weight Disord, 25:1277-1283.

Wadden TA, Bailey TS, Billings LK, Davies M, Frias JP, Koroleva A, et al. (2021) Effect of subcutaneous semaglutide vs placebo as an adjunct to intensive behavioral therapy on body weight in adults with overweight or obesity: the STEP 3 randomized clinical trial. JAMA, 325:1403-1413.

WHO, World Health Organization (2016) Obesity. https://www.who.int/en/news-room/fact-sheets/detail/obesity-and-overweight (Accessed 25.05.2021).

Yesil E, Ozdemir M, Aritici G, Aksoydan E (2019) Bel/boy oranı ve diğer antropometrik ölçümlerin kronik hastalık riski ile ilişkisinin değerlendirilmesi. Acıbadem Üniversitesi Sağlık Bilimleri Dergisi, 10:241-246.

Yilmaz BO, Cicek B, Kaner G (2018) Kayseri İlindeki liselerde öğrenim gören adölesanlarda obezite düzeyinin ve ilişkili risk faktörlerinin belirlenmesi. Turk Hijyen ve Deneysel Biyoloji Dergisi, 75:77-88.

Yoldağ F (2016) Obez bireylerde yüksek proteinli diyetler ile normal proteinli diyetlerin kilo verme açısından kıyaslanması (Yüksek lisans tezi)). Magusa, KKTC, Doğu Akdeniz Üniversitesi.

Authors Contributions. Authors attest that they have made an important scientific contribution to the study and have assisted with the drafting or revising of the manuscript.
Peer-review: Externally peer-reviewed.
Ethical Approval: Ethical approval was obtained from Eskişehir Osmangazi University Ethics Committee for the study. All participants gave informed consent.
Conflict of Interest: No conflict of interest was declared by the authors.
Financial Disclosure: The authors declared that this study has received no financial support.