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The Effect of Weight Cycling on Cardiometabolic Risk Factors in Women*

Kadınlarda Ağırılık Döngüsünün Kardiyometabolik Risk Faktörleri Üzerine Etkisi

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ABSTRACT

Aim: This study aims to examine weight cycling causes cardiometabolic risks in women.

Materials and Methods: This study was carried out on 60 volunteer women between the ages of 25-45 years who applied to Baskent University Hospital Endocrine Department for weight control. Individuals were applied a questionnaire face to face. Some biochemical parameters were taken from the patient files and anthropometric measurements were evaluated by dietitian. The individuals participating in the study were divided into two groups as those who experienced weight cycling (n: 20) and those who did not (n: 40).

Results: The mean BMI was 31.6 ± 4.76 kg/m² in the weight cyclers and 25.4 ± 4.49 kg/m² in non-cyclers ($p < 0.05$). The mean waist and hip circumference, waist / hip ratio, total body fat percentage and fat mass were higher in the weight cyclers compared to the non-cyclers ($p < 0.05$). The mean total cholesterol level was 202.2 ± 44.05 mg/dL and 178.1 ± 33.39 mg/dL, LDL-cholesterol level was 140.0 ± 40.29 mg/dL and 114.1 ± 28.99 mg/dL, triglyceride level was 129.0 ± 39.52 mg/dl and 99.3 ± 38.37 mg/dL in the weight cyclers and non-cyclers groups, respectively ($p < 0.05$).

Conclusion: Weight cycling may be considered as a cardiometabolic risk factor.

Keywords: Weight gain, Risk, Antropomerty.

ÖZET

Amaç: Bu çalışma, ağırılık döngüsünün kadınlarda kardiyometabolik risklere neden olduğunu incelemeyi amaçlamaktadır.

Gereç ve Yöntem: Bu çalışma, Başkent Üniversitesi Hastanesi Endokrin Bölümü'ne ağırılık kontrol programı için başvuran 25-45 yaş arası 60 gönüllü kadın üzerinde gerçekleştirilmiştir. Bireylere, yüz yüze anket uygulanmıştır. Bazı biyokimyasal parametreler hasta dosyalarından alınmıştır ve antropometrik ölçümler diyetisyen tarafından değerlendirilmiştir. Çalışmaya katılan bireyler ağırılık döngüsü yaşayan (n:20) ve ağırılık döngüsü yaşamayan (n:40) olarak iki gruba ayrılmıştır.

Bulgular: Ortalama BKİ, ağırılık döngüsü yaşayan bireylerde 31.6 ± 4.76 kg/m² ve ağırılık döngüsü yaşamayan bireylerde 25.4 ± 4.49 kg/m²'dir ($p < 0,05$). Ortalama bel ve kalça çevresi, bel/kalça oranı, toplam vücut yağ yüzdesi ve yağ kütlesi ağırılık döngüsü yaşayan bireylerde, ağırılık döngüsü yaşamayan bireylere göre daha yüksektir ($p < 0.05$). Ağırılık döngüsü yaşayan ve yaşamayan bireylerde, sırasıyla, ortalama toplam kolesterol düzeyi 202.2 ± 44.05 mg/dL ve 178.1 ± 33.39 mg/dL, LDL-kolesterol düzeyi 140.0 ± 40.29 mg/dL ve 114.1 ± 28.99 mg/dL, trigliserit düzeyi 129.0 ± 39.52 mg/dL ve 99.3 ± 38.37 mg/dL'dir ($p < 0,05$).

Sonuç: Ağırılık döngüsü, kardiyometabolik bir risk faktörü olarak kabul edilebilir.

Anahtar Kelimeler: Ağırılık artışı, Risk, Antropometri.

INTRODUCTION

Body weight control is the lengthy a consequence the energy balance. Since energy intake is equally to energy consume, body weight is stable. Overweight and obese patients should provide energy intake balance, thus enforced to obtain weight loss. The firstly strategy in weight loss is advised dietary programs plus physical activity, besides this strategy is contributed inflammation which is determinant of chronic diseases and visceral fat reduction. However, sustained successful weight loss hard state and so it is frequent to observe people engaging several popular weight loss diets which may result in weight regain. Weight cycling may be defined as “yo-yo-like” trend in body weight (Cereda et al., 2011). Although no standard definition exists, the reiterative loss and regain of body weight, linked to “weight cycling”, as well as “weight fluctuation” which appears to be frequently (Mason et al., 2013). In some studies it was referred to weight loss and gain of 9 kg or more at least 3 times (Field, Malspeis & Willett, 2009), weight loss and gain of 5% and more of body weight (Taing, Arden & Kuk, 2012), weight loss and gain of 5 kg or more and repeated once or more (Lahti-Koski, Männistö, Pietinen & Vartiainen, 2005), 5 or more weight loss and recovery of 5 kg or more (Cereda et al., 2011). It is a widely held view that weight cycle includes the number of cycles or the greatness of weight fluctuation, but these criteria are showed different results in researches which can make it hard to prove the prevalence of weight cycling. Because dieting is both common and reversible likely, it is believed that weight cycle is greatly prevalence. Besides, the prevalence of weight cycling examining studies in general population which is little (Lahti-Koski et al., 2005). In the period of weight loss, individuals may tend to eat carbohydrate-rich foods as a result of the decrease in basal metabolic rate due to the involuntary decreasing lean body mass (muscle mass), and with the routine of the diet. For this reason, individuals who engage in weight cycles lose less fat mass and more muscle mass compared to individuals who do not (Minutello et al., 2004). However, on the contrary, when the weight is regained, this is mostly from the fat tissue. The metabolic effects of weight cycling on body composition in overweight and obese individuals are not fully known. Insulin levels or insulin sensitivity in weight cyclers are potentially

influence because various appetite-regulating hormones that fluctuate in response to changes in energy modification are known to affect this state. These changes are also thought to cause obesity due to an increase in food intake because it may affect the hunger-satiety mechanisms. Mostly, a relationship has been found between fluctuations in cardiovascular risk parameters and inconstancy in food intake (Montani, Viecegli, Prévot & Dulloo, 2006). Weight cycling is observed to be associated with body fat accumulation and obesity. Previous studies has showed that a connection between weight changes and cardiovascular morbidity and mortality (Kakinami, Knauper & Brunet, 2020; Zou et al., 2019). Also, weight cycle which cause of hypertension, accumulation of visceral fat, insulin resistance and dyslipidemia which can impact in increase cardiovascular risks. Therefore, it is aimed to prevent weight gain, besides; it is possible to prevent many chronic diseases and mortality such as caused by obesity, cardiovascular diseases, hypertension, insulin resistance, diabetes mellitus, some cancers and respiratory disorders (Montani, Schutz & Dulloo, 2015). Weight cycle history is a major problem in women who may be more probably to weight gain across their lifetime due to a higher prevalence of dieting a greater desiderate to weight loss and a higher increasing social pressure to lose weight. (Martin, Herrick, Sarafrazi & Ogden, 2018). Furthermore, women’s reproductive role (pregnancy, menopause) is implicated in the female excess in obesity. Supposing that over half of adult US women are thinking to desire losing weight and the thick probability of weight regain again, it emphasize women’s cardiovascular health an important relationship in relation to weight loss tendency (Martin et al., 2018). Accordingly, the objective of this study is to investigate the relationship the effects of weight cycling on cardiometabolic risks in women.

MATERIALS AND METHODS

Research Type

This study which is a case control study is planned to investigate the relationship the effects of weight cycling on cardiometabolic risks in women.

Study Population

Universe of the study was defined women who Baskent University Hospital Endocrine

Department for weight control. The sample of study was to be included volunteer women between the ages of 25-45 years and non pregnant/lactating who consulted to Baskent University Hospital Endocrine Department for weight control between May- September 2016. The participants with a medical history of thyroid, neurological, psychological diseases and eating disorders were excluded from the study. Also, individuals with Cushing syndrome or hypogonadism and taking glucocorticoid therapy were not included in the study. The comparison of two independent groups (case-control) was planned by considering 1 case vs. 2 controls. In the comparison of any quantitative measurement, it was found appropriate to work with at least 60 people in order to reveal a medium to large effect size with a 5% Type I error probability and 85% power probability within the knowledge of the literature. In the study was taken all volunteer women who provide the inclusion criteria and it

Data Collection Tools

A questionnaire was applied by face to face interview method to determine the sociodemographic characteristics, general and nutritional habits of the individuals. In the content of the questionnaire, questions about the disease status, dieting frequency, weight changes and frequency of the individuals were also included.

Definition of Weight Cycle

The weight cycle was defined as loss and regain of body weight. The individuals were classified by reference to the weight cycle and weight cycle degree definitions defined in the study conducted by Lahti-Koski et al. (Lahti-Koski et al., 2005). The individuals participating in the study were classified into two groups according to the weight changes and the frequency of changes in the last 10 years. The individuals who lost 5 kg or more weight and regained weight more than 2 times in the last 10 years were defined as weight cyclers and the others were defined as non-cyclers group

(Figure 1).

Anthropometric Measurements and Body Composition

Beginning of the study, all anthropometric data were evaluated at dietetic policlinic by dietitian researcher. Height was measured with SECA. Body weight was measured to the nearest 0.1 kg using an automatic calibrated electronic scale. Waist circumference (WC) and hip circumference (HC) was measured by tape. The waist - hip ratio (WHR) and waist to height ratio (WHtR) were calculated. BMI was calculated and the results were evaluated according to WHO classification. A BMI between 18.5-24.9 kg/m² was considers normal, BMI of 25-29 kg/m² was considered overweight, and a BMI \geq 30 kg/m² were considered obese (WHO, 2016). An analyzer of bioelectrical impedance (JAWON IOI 353) was used for the estimation of body composition. The fat mass index (FMI), is a measure of relative fat content, was calculated as (fat mass)/height. WC cut-off points in metabolic syndrome definition were used (WC \geq 88 cm in women). The standard cut-off point of 0.5 was used for WHtR.

Biochemical parameters

The biochemical parameters of the individuals were taken from the patient files. The biochemical parameters [fasting plasma glucose (FPG), fasting insulin, total cholesterol (TC), Low density lipoprotein-cholesterol (LDL-C), High density lipoprotein-cholesterol (HDL-C), triglyceride, alanine aminotransferase (ALT), aspartate aminotransferase (AST), uric acid and thyroid stimulating hormone (TSH)] were analyzed at Başkent University Ankara Hospital Laboratory by standard methods. Serum glucose was measured using an autoanalyzer, fasting serum insulin was measured using the Architect insulin assay. Lipid profiles [total cholesterol, low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and triglycerides] were determined. TSH, was

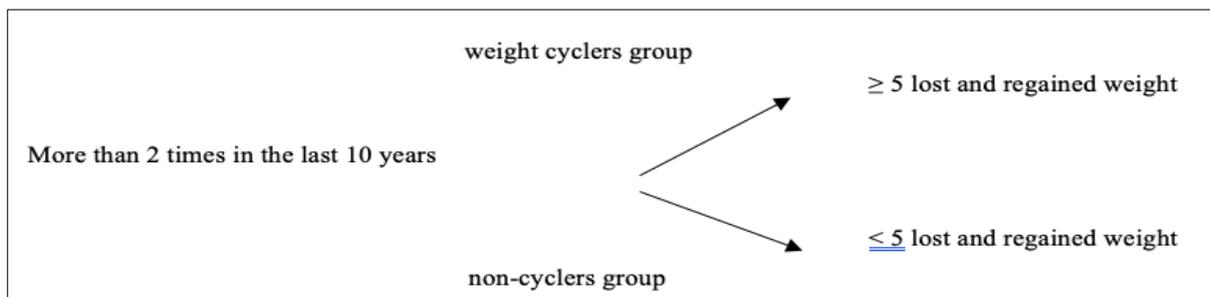


Figure 1. Definition of weight cycle

determined via ECLIA (Electrochemiluminescence Immunoassay); AST and ALT were determined by colorimetric methods. Insulin resistance (IR) was calculated by using the homeostasis model assessment of insulin resistance (HOMA-IR) model [HOMA-IR = fasting insulin ($\mu\text{IU/mL}$)*fasting glucose (mmol/L)/22.5] (Gutch, Kumar, Razi, Gupta, Gupta, 2015). The Dyslipidemia cut-offs the National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) III criteria were used in this study. According to this criteria, TC <200 mg/dL is normal and ≥ 200 mg/dL is high; LDL-C <130 mg/dL is normal and ≥ 130 mg/dL is high and TG <150 mg/dL is normal and ≥ 150 mg/dL is high (Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, 2001). Individuals with HOMA-IR values ≥ 2.5 considered to be insulin resistant in this study.

Ethics Consideration

The study protocol was approved by the Baskent University Institutional Review Board and Ethics Committee (No. KA16/162). Informed consent was obtained from all participants. The study was completed in accordance with the principles of the Declaration of Helsinki.

Data analysis

Statistical analysis was performed using SPSS software (version 26). The data are presented as mean \pm standard deviation ($\bar{X} \pm \text{SD}$), minimum-maximum values or number (%). The data were normalized using The Kolmogorov–Smirnov test. The Student unpaired t-test was used for comparison between 2 groups. Data from study were associated 95% confidence interval. 0.05 descriptive data were generated for all variables and p-value of <0.05 was considered statistically significant.

RESULTS

The mean age of the individuals was 35.7 ± 6.23 years and the 28.3% was in 41-45 age group. In the study, 24 of the women had a history of pregnancy. The mean weight gain of the individuals was 17.3 ± 5.28 kg during the first pregnancy and 15.5 ± 5.31 kg during the second pregnancy. Body weight gain percentage in adulthood of women was determined to be 38.8% (54.7 ± 8.70 kg to 75.9 ± 15.70 kg) (Table 1).

In Table 2, anthropometric measurements and

body composition analysis of weight cyclers and non-cyclers group were shown. The mean body mass index (BMI) was 31.6 ± 4.76 kg/m² in weight cyclers group, 25.4 ± 4.49 kg/m² in non-cyclers group (p<0.05). The mean body weight, waist and hip circumference, waist- hip ratio, waist- height ratio were higher in the weight cyclers group than non-cyclers group and the differences between groups were statistically significant (p <0.05). The percentage of total body fat, fat mass, fat-free mass and total body water values were higher in the weight cyclers group than non-cyclers group and the differences were statistically significant (p <0.05). The mean value of fat mass index in weight cyclers group and non-cyclers group was 19.4 ± 5.42 and 13.2 ± 4.68 , respectively (p<0.05) (Table 2).

Table 1. Distribution of Age Groups, Weight Cycle Degree and the Mean Weight Gain During Pregnancy of Individuals

Demographic Characteristics	n(60)	%
Age, years ($\bar{X} \pm \text{SD}$)*	35.7 ± 6.23	
Age Groups (years)[†]		
25-30	16	26.7
31-35	11	18.3
36-40	16	26.7
41-45	17	28.3
Education[†]		
High School	8	13.3
University	44	73.4
Post Graduate	8	13.3
Marital Status		
Married	42	70.0
Single	18	30.0
Weight gain during pregnancy (kg)*#	$\bar{X} \pm \text{SD}$	Min-Max
First pregnancy	17.3 ± 5.28	8.0 – 30.0
Second pregnancy	15.5 ± 5.31	8.0 – 28.0
Weight changes ≥ 20 years (kg)*		
Minimum body weight	54.7 ± 8.70	40-72
Maximum body weight	75.9 ± 15.70	51-120

*Student t test ; [†] Chisquare test; SD: Standart Deviation, Min: Minimum, Max: Maximum

Data analysis was performed on 24 women with a history of pregnancy.

Table 2. The Comparison of Anthropometric Measurement and Body Composition Values of Groups

Anthropometric Measurements and Body composition	Weight Cyclers (n:20)		Non-Cyclers (n:40)		p-value
	$\bar{X} \pm SD$	min - max	$\bar{X} \pm SD$	min - max	
Weight (kg)	82.6 ± 15.47	59.4 - 119.7	66.4 ± 10.23	49.8 - 92.8	0.0001*
BMI (kg/m ²)	31.6 ± 4.76	23.8 - 41.4	25.4 ± 4.49	20.1 - 40.8	0.0001*
Waist Circumference (cm)	96.9 ± 10.99	80.0 - 127.0	82.3 ± 7.98	68.0 - 100.0	0.0001*
Hip Circumference (cm)	111.6 ± 10.32	98.0 - 139.0	101.0 ± 7.98	88.0 - 121.0	0.0002*
Waist / Hip ratio	0.8 ± 0.03	0.8 - 0.9	0.8 ± 0.03	0.6 - 0.8	0.0002*
Waist / Height Ratio	0.60 ± 0.01	0.49 - 0.75	0.50 ± 0.05	0.39 - 0.64	0.0001*
Total Body Fat (%)	37.2 ± 4.50	28.3 - 44.6	31.1 ± 4.64	22.4 - 41.3	0.0002*
Fat Mass (kg)	31.5 ± 9.40	16.8 - 53.4	21.7 ± 6.79	13.4 - 37.9	0.0002*
Fat-Free Mass (kg)	51.1 ± 6.68	40.5 - 66.3	44.6 ± 4.65	35.1 - 54.9	0.0001*
Total Body Water (kg)	37.4 ± 4.96	29.7 - 47.7	32.8 ± 3.45	24.6 - 41.2	0.0001*
Fat mass index (FMI)	19.4 ± 5.42	10.7 - 31.4	13.2 ± 4.68	7.8 - 23.9	0.0001*

BMI: Body Mass Index

* Student t-test, p<0.05

The mean values of biochemical parameters of weight cyclers and non-cyclers groups were shown in Table 3. The mean serum lipid profiles which are total cholesterol, LDL- Cholesterol, triglyceride, besides, AST, ALT and uric acid levels were higher in the weight cyclers group

compared to the non-cyclers group and the differences were statistically significant (p<0.05) The mean HDL - Cholesterol, fasting insulin, TSH levels and HOMA-IR values were not statistically different between the two groups (p> 0.05) (Table 3).

Table 3. The Mean Values of Biochemical Parameters of Weight Cyclers and Non-Cyclers Groups

Biochemical Parameters	Weight Cyclers (n:20)		Non-Cyclers (n:40)		p-value
	$\bar{X} \pm SD$	Min - Max	$\bar{X} \pm SD$	Min - Max	
FBG (mg/dL)	95.6 ± 11.69	81.0 - 118.0	87.6 ± 7.69	76.0 - 105.0	0.010*
Total-Cholestrol (mg/dL)	202.2 ± 44.05	157.0 - 327.0	178.1 ± 33.39	120.0 - 268.0	0.022*
LDL-Cholestrol (mg/dL)	140.0 ± 40.29	95.0 - 274.7	114.1 ± 28.99	71.0 - 198.0	0.006*
HDL-Cholestrol (mg/dL)	47.1 ± 9.70	35.0 - 75.0	49.3 ± 9.20	33.0 - 71.0	0.385
Triglycerides (mg/dL)	129.0 ± 39.52	62.0 - 223.0	99.3 ± 38.37	46.0 - 213.0	0.007*
Fasting insuline (µU/mL)	11.8 ± 7.30	4.8 - 32.7	8.7 ± 3.72	3.2 - 17.4	0.085
HOMA-IR	2.9 ± 2.12	1.0 - 9.2	1.9 ± 0.93	0.6 - 4.1	0.059
TSH (µIU/mL)	1.7 ± 0.67	0.9 - 3.9	1.3 ± 0.53	0.5 - 2.3	0.054
AST (U/L)	16.6 ± 4.21	11.0 - 28.0	13.0 ± 3.54	8.0 - 23.0	0.001*
ALT (U/L)	16.8 ± 8.65	8.0 - 47.0	10.7 ± 4.33	6.0 - 24.0	0.001*
Uric acid (mg/dL)	5.8 ± 1.34	3.8 - 8.6	4.8 ± 0.87	3.1 - 7.4	0.001*

FBG: fasting blood glucose, HOMA -IR: Insulin resistance, TSH: thyroid stimulating hormone ALT: Alanine aminotransferase, AST: aspartate aminotransferase

* Student t-test, p<0.05

The frequency of individuals with BMI ≥ 25 kg/m² was 85.0% in weight cyclers and 42.5% in non-cyclers groups (p <0.05). The 75.0% of the individuals in the weight cyclers and 22.5% of the non-cyclers group have waist circumference ≥ 88 cm (p<0.05); the 90.0% of the individuals in the weight cyclers and 42.5% of the control group

have waist to height ratios ≥ 0.5 (p <0.05). It was determined that 55% of the weight cyclers group and 22.5% of the non-cyclers group had serum LDL- Cholestrol levels of 130 mg/dL and above and between groups difference was statistically significant (p <0.05) (Table 4).

Table 4. The Distribution of Anthropometric Measurements and Biochemical Parameters in Groups According to the Reference Values

Anthropometric Measurements and Biochemical Parameters	Weight Cyclers	Non-Cyclers	Test value*	P - value
	(n:20) n (%)	(n:40) n (%)		
BMI (kg/m²)				
18.5-25	3 (15.0)	23 (57.5)	9.808	0.002*
≥25	17 (85.0)	17 (42.5)		
Waist circumference (cm)				
<88	5 (25.0)	31 (77.5)	15.313	0.000*
≥88	15 (75.0)	9 (22.5)		
Waist/height ratio				
<0.5	2 (10.0)	23 (57.5)	12.377	0.000*
≥0.5	18 (90.0)	17 (42.5)		
Total cholesterol (mg/L)				
<200	13 (65.0)	32 (80.0)	1.600	0.206
≥200	7 (35.0)	8 (20.0)		
LDL- cholesterol (mg/dL)				
<130	9 (45.0)	31 (77.5)	6.338	0.012*
≥130	11 (55.0)	9 (22.5)		
Triglyceride (mg/dL)				
<150	14 (70.0)	35 (87.5)	2.727	0.099
≥150	6 (30.0)	5 (12.5)		
HOMA-IR				
<2.49	13 (65.0)	32 (80.0)	1.600	0.206
≥2.5	7 (35.0)	8 (20.0)		

*Chi-square test, p<0.05

DISCUSSION

Since 1980, the prevalence of obesity and overweight reached to two times more universally. In 2016, more than 1.9 billion adults were either overweight or obese; also of whom more than 650 million were obese. Women who are among the ratio of overweight and obesity is higher compared to men in the world. (WHO, 2016). According to Organisation for Economic Co – operation and Development (OECD) 2017 report, in the majority of countries, women are more obese than men (OECD, 2017). Also in our country, the prevalence of obesity was shown to be 24.9% in men, 39.1% in women in Turkey Nutrition and Health Survey 2017 (TNHS, 2017). Women are especially vulnerable to weight gain because they experience certain life-changing experiences (i.e., pregnancy and childbirth) that directly impact body weight. Pregnancy and post-delivery period lead to significant amount of fat mass retention (Rooney & Schauburger, 2002). Pregnancy with the most body weight fluctuations is defined as the key time in the strategy to reduce the obesity epidemic. Although the range of weight gain advised is wide, pre-gestational body mass index (BMI) are important to weight gain in pregnancy (Centers for Disease Control and

Prevention, 2003). In general guidelines state that healthy women who have a normal weight for their height (BMI 18.5– 24.9) can recommended to gain weight 11.5–16 kg in pregnancy (Committee to Reexamine IOM Pregnancy Weight Guidelines, 2009). In this study, it was determined that individuals had an average weight gain of 17.3 ± 5.28 kg during the first pregnancy and 15.5 ± 5.31 kg during the second pregnancy.

In Turkey, Turkey Demographic and Health Survey 2018 report (TDHS – 2018), the mean body mass index of the female subjects aged between 15-49 years was 27.3 kg / m²; the 29% were overweight and 30% were obese. This shows that the percentage of women who became obese in the last 15 years increased from 23% to 30% (Hacettepe University Institute of Population Studies., 2018). The body weight of individuals can vary greatly in a short and long period, because regaining weight after voluntary weight loss is quite common. Since there is no clear definition of the weight cycle, there may be differences between the frequencies of this issue. Most studies calculated frequencies of weight cycle from 20% to 55% for women and 20% to 35% for men (Montani et al., 2015). Fluctuation in body weight, that is weight cycling is seen

strongly related to increased all-cause mortality and the pathogenesis of chronic diseases. Even though development of weight cycle is not clear, it is now understood that the “repeated overshoot” and increased visceral energy repartitioning hypotheses play an important role (Montani et al., 2006). Weight cycling or “yo-yo” dieting are known to determine to increase inappropriate and permanent loss of lean body mass and also gain of fat mass (Prentice et al., 1992). Weight cycle may contribute to cardiovascular disease risk by leading to visceral fat or pervascular adipose tissue, which are more strongly associated with cardiovascular disease risk. The biological mechanisms behind preferential fat deposition are not fully elucidated in humans, but the repeated overshoot theory is also proposed to explain how weight cycling may increase cardiovascular disease risk (Byun, Bello, Liao, Makarem & Aggarwal, 2019). Generally, in the case of weight regain, muscle mass increases less, while body fat increases more (Galal et al., 2008). In a study, it was seen that visceral adiposity is less in weight regain, while fat mass in the subcutaneous abdominal and hip regions is more (van der Kooy, Leenen, Seidell, Deurenberg & Hautvast, 1993). Wallner et al. (Wallner et al., 2004), found that women with a history of weight cycling had significantly higher levels of subcutaneous adipose tissue over the abdominal region than the control group. However, one intervention study determined that weight gain following weight loss did not adversely affect body fat distribution (Bosy-Westphal et al., 2013). In this study, the body mass index, waist circumference and waist / hip ratios were more likely to be higher in weight cyclers group than the non-cyclers group and this condition is determined to statistically significant ($p < 0.05$). Due to weight-cyclers have higher the body mass index, waist circumference and waist / hip ratios, cyclers may have cardiovascular risk.

Cardiovascular diseases are globally the most common diseases, and in 2017 were determined 17.8 million deaths due to this (Roth et al., 2018). In 2019, out of the 17 million premature deaths due to noncommunicable diseases, 38% were caused by CVDs (WHO, 2021). In our country, conducted in 2017, Turkey Household Health Survey "Risk Factors Prevalence of Noncommunicable Diseases" according to the results of the study, approximately one in every ten respondents in the 40-69 age group (10.5%) of 10-year risk of cardiovascular disease is greater than 30%, or heart vascular disease is present

(Üner, Balcılar & Ergüder, 2018). In addition, according to Turkish Statistical Institute (TUIK) 2019 data, 36.8% of deaths were caused by circulatory system diseases (TUIK, 2019). Obese women have a higher prevalence of cardiometabolic risk factors, as reported in studies from different parts of the world (Sharma, Sharma, Rawat & Arya, 2017). For the most part, a relationship has been found between fluctuations in cardiovascular risk parameters and fluctuations in food intake. It has been stated that sudden weight gains occurring in the period after the restriction of food intake may lead to an increase in cardiovascular diseases due to the increase in heart rate, blood pressure, sympathetic activity, glucose, insulin, cholesterol and triglyceride (Montani et al., 2006). In a follow-up study conducted in Japan, it was determined that fluctuations in BMI in consequence of weight loss and gain had a strong effect on systolic and diastolic blood pressure, serum lipid profiles and fasting blood glucose, which were examined as cardiovascular risk factors (Lee et al., 2001). In a cross – sectional study, it was found that 7% of women with a history of weight cycling had lower HDL – cholesterol levels, also directly affecting the degree of weight cycles (Olson et al., 2000). Field et al. (Field et al., 2004) found a strong relationship between weight cycling and BMI. In another study, the relationship between high BMI and weight cycling was demonstrated, and its positive relationship in the development of atherosclerosis and cardiovascular diseases was also shown (Reininghaus et al., 2015). Vergnaud et al. (Vergnaud et al., 2008) showed that body weight fluctuations are also an independent risk factor for metabolic syndrome. In this study, fasting blood glucose, total cholesterol and triglycerides were more likely to be higher in the weight cyclers compared to the non-cyclers group ($p < 0.05$). At the same time, LDL - Cholesterol which is a major cause of heart disease, was also higher in the weight cyclers than the non-cyclers group (55.0% and 22.5%, respectively) in this study. The difference was statistically significant between groups ($p < 0.05$).

CONCLUSION

Although a lot of studies has been done internationally on weight cycle, our study is the first done nationally. In this study, body mass index, waist circumference, waist / hip ratio, serum LDL - cholesterol values which cardiometabolic risk factors were found to be

higher in the weight cyclers group. For this reason, it is thought that regaining weight, that is, having a weight cycle history that will occur after weight loss cannot be preserved, may be a risk factor for cardiovascular diseases and diabetes. Since this study is one of the rare studies dealing with a subject that has not been included in studies in our country, it is thought to be important in terms of shedding light on the subject, although the sample size is insufficient. The data in a new comprehensive work to be done by increasing the number of samples is expected to be more meaningful. In addition, the lack of a clear parameter in determining the weight cycle of individuals in the study and the fact that individuals were asked about their weight loss retrospectively constitute limitations in determining the weight cycle. In mostly women, one of the main reasons for the fluctuations in body weight are the weight gained during pregnancy. Therefore, weight changes during pregnancy should be questioned more clearly in future studies. It is thought that the results obtained in the study will be an important source for other scientific studies and all other activities. Such studies should be done periodically and shared with relevant disciplines.

Ethics Committe Approval

The study protocol was approved by the Baskent University Institutional Review Board and Ethics Committee (Date: April 12, 2016 and No. KA16/162).

Author Contributions

Idea/Concept: E.A.O, G.K.; Design: E.A.O, G.K.; Supervision/Consulting: G.K.; Analysis and/or Interpretation: E.A.O, G.K.; Literature Search: E.A.O.; Writing the Article: E.A.O; Critical Review: G.K.

Peer-review

Externally peer-reviewed.

Conflict of Interest

All authors declare that they have no conflicts of interest and nothing to disclose

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