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Araştırma Makalesi–Research Paper

CHANGES IN HEALTHY WOMEN'S FOOD PREFERENCES, TASTE, BODY, AND MOOD BEFORE AND DURING MENSTRUATION

SAĞLIKLI KADINLARIN MENSTRÜASYON ÖNCESI VE SIRASINDA BESİN TERCİHLERİ, TAT, VÜCUT VE RUH HALİNDEKİ DEĞİŞİKLİKLER

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Özet

Sağlıklı kadınlarda menstrual siklus boyunca tat, beslenme, bedensel ve psikolojik değişimler yaşandığı çeşitli çalışmalarca gösterilmiştir. Bu çalışmanın amacı sağlıklı kadınların menstruasyon öncesi ve sırası dönemlerinde yaşadıkları tat, vücut ağırlığı değişimi, besin tercihleri ve beden/mood değişimlerini araştırmaktır. Bu kesitsel çalışmaya, 18 ile 45 yaşları arasında düzenli adet gören 400 sağlıklı kadın katılmıştır. Katılımcıların genel özellikleri, foliküler faz (menstruasyon sırasında) ve luteal faz (premenstrüel dönem) dönemlerine ait mod ve bedensel değişiklikler, tat değişiklikleri ile besin tercihlerini inceleyen sorulardan oluşan online anket formu uygulanmıştır. Katılımcıların %62.2'si luteal fazda vücut ağırlığı (ort 1.2 kg) artışı, %56.7'si iştah artışı yaşadığını ifade etmişlerdir. Ayrıca, luteal fazda, katılımcıların tamamında tatlı tüketimi ve çikolata tüketimi isteğinde artış, karın şişliği, göğüs hassasiyeti, sinirlilik hissinde artış olduğunu bildirilmiştir. Luteal fazda yaşanan vücut ağırlığı artışı ile tuzlu gıda tüketim isteği, ödem, iştah artışı, karın şişliği ve bir takım diğer değişimlerde zayıf fakat pozitif yönlü korelasyonlar tespit edilmiştir ($p<0.05$). Çalışmamız luteal fazda kadınların tat, besin tercihleri, bedensel ve psikolojik değişimler yaşadıklarını göstermektedir. Bu değişiklikleri anlamak kadın ve menstruasyon sağlığı açısından büyük önem taşımaktadır.

Anahtar Kelimeler: Yeme Arzusu, Adet Döngüsü, Kadın, Vücut Ağırlığı

Abstract

Studies have demonstrated changes in taste, food intake, physical and psychological characteristics of healthy women during menstrual cycle. The aim of this study is to examine the changes in taste, weight, physical, mood and food preferences of healthy women before and during menstruation. This decriptive study included 400 healthy regularly menstruating women aged 18-45 years in Turkey. An online survey including questions examining the participants' characteristics, and changes during the follicular phase and the luteal phase was used. A total of 62.2% of the participants reported increases in body weight (1.2kg), and 56.7% of them stated an increase in appetite in the luteal phase. In addition, in the luteal phase, they reported an increase in the craving for sweet taste and chocolate, abdominal bloating and breast tenderness, and the feeling of irritability during the luteal phase. Craving for salty flavour, edema, increased appetite, and abdominal bloating had weak but positive correlations with weight gain during the luteal phase. The results of the present study indicated that the women had changes in taste and food preferences as well as physical and psychological changes during the luteal phase. Understanding these changes is of great importance for menstrual health.

Keywords: Food Craving, Menstrual Cycle, Women, Weight

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1. INTRODUCTION

Normal menstruation is currently defined as cyclical bleeding from the uterine corpus between menarche and menopause. While almost 30% of women have changes in volume or pattern of menstrual blood flow, many women suffer from multiple physiological and psychological symptoms associated with the menstrual cycle, such as pain, dysmenorrhea, mood changes, tension, anxiety, irritability, depression, fatigue, headache, breast tenderness, increased appetite, and edema (Critchley et al., 2020, pp. 624-666). Eating habits and appetite change according to the phases of the menstrual cycle. Food intake is lowest in the periovulatory phase and highest in the luteal phase (Özçiftçi and Kızıltan, 2021, pp. 26-37). Menstrual health is thus an essential component of overall health due to the significant effects of menstruation on physical, mental, and social health (Critchley et al., 2020, pp. 624-666; Esin et al., 2016, pp.23-27;)

Food intake is affected by neurochemical, hormonal, physiological, and psychological factors. Many studies have demonstrated that hormonal fluctuations during the menstrual cycle can cause significant differences in women's appetite, energy, and macronutrient intake (Kammoun et al., 2017, pp.33-37; Cheikh Ismail et al., 2009, pp.124-128; Martini et al., 1994, pp. 895-898; Özçiftçi and Kızıltan, 2021, pp. 26-37). These changes could be explained by the effect of oestrogen and progesterone hormones on the secretion of some gastrointestinal hormones that regulate stomach emptying and appetite-energy intake. Studies on both animals and humans have suggested that energy intake is lower during the follicular phase, where oestrogen levels are relatively high, and energy intake increases during the luteal phase, where progesterone levels are highest (Brennan et al., 2009, pp. 602-610; Özçiftçi and Kızıltan, 2021, pp. 26-37). Moreover, high progesterone and estradiol levels during the mid-luteal phase may also be associated with emotional eating behavior (Serin and Şanlıer, 2018, pp.135-146). Furthermore, changes in body water throughout the menstrual cycle have been demonstrated to affect body composition (Cumberledge et al., 2018, pp. 625-632) and weight increases before menstruation and reduces during menstruation (Prajapati et al., 2021, pp.21-25).

Studies examined changes in dietary habits, appetite, and mood during the menstrual cycle is limited in our country. The aim of this study is to examine the overall dietary habits of healthy women of reproductive age as well as body, mood and taste changes and food preferences during the premenstrual (the luteal phase) and menstruation (the follicular phase) periods. The secondary objective was to assess possible correlation between statement of weight gain and changes during both periods.

2. MATERIALS AND METHODS

Inclusion-Exclusion Criteria and Participants

This cross-sectional study was conducted with the voluntary participation of 400 healthy women of reproductive age between March and November 2021 in Turkey. Simple and time restricted random method was used for the study design. The inclusion criteria were determined as follows; being 18 years of age and older, being literate, having internet access, and regularly menstruating. Cycle lengths between 25 to 30 days is accepted as healthy and regularly menstruating (Reed and Carr, 2018, pp.1) The exclusion criteria were determined as follows; undergoing hormonal contraception or corticosteroid treatment, being pregnant or breastfeeding, suffering from endocrine diseases and conditions that may affect food preferences, eating behaviour disorders, going through menopause, and undergoing a total or partial hysterectomy. A total 451 people were reached in the study. When the responses of the participants were analysed, duplicated, inconsistent, or incomplete data were excluded from the study. As a result, the study was completed with 400 people.

Online questionnaire

To preserve social distancing precautions between the participants and the researchers an online questionnaire (Google Form) technique was applied. The study form was prepared by the researchers after the review of the relevant literature (Kammoun et al., 2017, pp.33-37; Martini et al., 1994, pp.895-899; Hashim et al., 2019, p.1939; Gorczyca et al., 2016, pp.1181-1188). The first section of the questionnaire includes questions about age, height, weight, marital status, income level, and education level, while the second section includes questions regarding eating habits. The third section of the questionnaire includes questions about mood and physical changes, taste changes, and food preferences during the follicular phase (menstruation period) and the luteal phase (premenstrual period). These questions were formatted on a 5-point Likert scale (1-strongly disagree, 2-agree, 3-neither agree nor disagree, 4-agree, 5-strongly agree), and the participants marked the option that best fitted them. The questions were asked about the luteal phase; "My craving for sweets increases during the premenstrual period", "My chocolate consumption increases during the premenstrual period", and the questions related to the follicular phase were "My craving for sweets increases during the menstruation period" etc. The participants were asked to answer the questions by considering the last six months.

Several dieticians examined the questionnaire form, which was prepared based on the literature, and it was revised based on their feedback. The initial online form was applied to the students in the nutrition and dietetics department, as well as volunteer women of various ages (20 people). The online questionnaire form was made clear and applicable once the feedback was acquired, and the study was made accessible to the participants. The study did not include the data of the first 20 participants. The participants were reached through social media.

For the reliability of the questionnaire, the internal consistency was analyzed with Cronbach's α coefficient, and its found to be 0.96 that suggests a good internal consistency.

Ethics

An ethics committee approval was acquired from the Ethics Committee of the University for the study, which was conducted in accordance with the Declaration of Helsinki(No: 2021/06, dated 23.06.2021). Top of the online survey states information about the study, inclusion and exclusion criteria. One question about voluntary participation in the study appears at the top of the survey, and it is designed in such a way that participants may reach the questionnaire if they agree to participate in the study. Each participant filled out the survey only once.

Statistical Analysis

The IBM SPSS Statistics 20.0 software was used to conduct all analyses. To determine if the distribution was normal, the Kolmogorov-Smirnov test was used. Descriptive statistics for the participants' demographic and nutritional characteristics; mean±standard deviation, minimum-maximum values for homogeneously distributed data; and median and interquartile range (25-75: Q1-Q3) for heterogeneously distributed data were shown, and the qualitative data were presented as number (n) and percentage (%). The Wilcoxon test was applied to compare the changes of the participants during the luteal and follicular phases. For the correlation analysis of stated weight change with taste, physical, and mood changes, the bivariate Spearman's correlation coefficient (non-homogeneous) was utilised. These correlations were examined and only those that were found to be statistically significant were present in results. In analyses, the statistical significance level was accepted as $p<0.05$.

3. RESULTS

General characteristics of the participants

The study was conducted with 400 healthy women between the ages of 18 and 45 (median: 23 years). One hundred and nine (27.3%) of the participants were married, while 291 (72.8%) were single. Median age of menarche was 13 years. Table 1 shows the overall characteristics of the participants.

Changes in appetite and body weight

During the luteal phase, 56.7% (n:227) reported an increase in appetite and 62.2% (n: 249) reported a weight change. Eighty four percent of those (n:211) who stated that they had a change in weight indicated the amount of weight change and, they had an average weight gain of 1.2±0.5 kg (min. 0.5- max. 3 kg).

Table 1. General Characteristic of Participants

General Characteristic	**Median (Q1-Q3)**		**n (%)**
		Education	
Age (year)	23 (21-30)	High School	39 (9.7)
Height (cm)	164 (160-170)	Graduate	307 (76.8)
Weight (kg)	58 (52-65)	Postgraduate	54 (13.5)
Menarche (year)	13 (12-14)	**Profession**	
Body Mass Index (kg/m^2)	21.6 (19.5-23.7)	Student	240 (60)
		Housewife	33 (8.2)
		Employed	127 (31.7)
		Current Smoker	155 (38.7)
		Alcohol Drinker	225 (56.2)

The taste, physical, and mood changes during the luteal and follicular phases

Table 2 shows the taste, physical, and mood changes experienced by the participants during the luteal and follicular phases. The participants responded that they agreed with the directive "their craving for sweets increases" during both periods, however they did not agreed with the increase for salty, sour, and bitter flavours. They were undecided about feeling tired. They reported that they did not experience concentration problems and forgetfulness. They answered that they agreed with the increase in abdominal bloating in both periods, and breast tenderness only in the luteal phase. Irritability was the only psychological symptom they reported having increased in luteal phase.

The correlations between the change of weight (kg) and the scores of taste, physical, and mood change before and during menstruation were examined and were present in Table 3. Weight gain during the luteal phase had weak but positive correlations with the craving for salty flavour, concentration problems, abdominal bloating, edema, increased appetite, sleep problems, constipation, irritability, anxious, and social withdrawal ($p<0.05$). In the follicular phase, similar correlations were observed, as well (Table 3).

Table 2. Taste, body and mood changes in the luteal phase and the follicular phase

	Mean ±SD		
Changings	**Luteal phase**	**Follicular phase**	**p**
Cravings			
"My craving for sweets increases during the premenstrual/menstruation period."	3.90±1.1	3.86±1.2	0.348
"My craving for salty foods increases during the premenstrual/menstruation period."	2.38±1.2	2.24±1.2	0.001*
"My craving for sour foods increases during the premenstrual/menstruation period."	1.89±1.1	1.80±1.0	0.008*
"My craving for bitter foods increases during the premenstrual/menstruation period."	1.71±0.9	1.64±1.9	0.030*
Behavioral symptoms			
"I feel tired."	3.37±1.3	3.46±1.3	0.031*
"I have a lack of concentration."	2.64±1.4	2.60±1.4	0.468
"I am forgetful."	1.89±1.1	1.93±1.1	0.286
Physical symptoms			
"I feel abdominal bloating."	3.81±1.1	3.62±1.2	0.001*
"I have tenderness in my breasts."	3.63±1.3	3.30±1.3	0.000*
"I have the feeling of edema."	3.44±1.4	3.23±1.4	0.000*
"My appetite is increasing."	3.38±1.3	3.05±1.4	0.000*
"My acne is increasing."	3.11±1.4	2.80±1.4	0.000*
"I'm having a headache."	2.66±1.4	2.60±1.4	0.137

"I am having sleep problems."	2.25±1.3	2.26±1.3	0.852
"I am constipated."	2.13±1.3	1.92±1.2	0.000*
Psychological symptoms			
"I feel irritable."	3.69±1,2	3.43±1.3	0.000*
"I feel anxious."	3.39±1,3	3.19±1.4	0.000*
"I feel depressed."	3.25±1.4	3.07±1.4	0.001*
"I don't want to socialize."	2.55±1.4	2.68±1.4	0.038*

Table 3. The correlation between body weight increase and taste, body and mood changes in the luteal phase and the follicular phase

Changings	**Body Weight Increase** (r, p)	
	Luteal phase	**Follicular phase**
Cravings		
"My craving for sweets increases during the premenstrual/menstruation period."	0.081, 0.241	0.067, 0.331
"My craving for salty foods increases during the premenstrual/menstruation period."	0.213, 0.002**	0.111, 0.026*
"My craving for sour foods increases during the premenstrual/menstruation period."	0.025, 0.720	0.031, 0.653
"My craving for bitter foods increases during the premenstrual/menstruation period."	0.001, 0.984	-0.017, 0.805
Behavioral symptoms		
"I feel tired."	0.078, 0.261	0.171, 0.013**

"I have a lack of concentration."	0.148, 0.032**	0.151, 0.028
"I am forgetful."	0.064, 0.358	0.023, 0.735
Physical symptoms		
"I feel abdominal bloating."	0.208, 0.002**	0.111, 0.109
"I have tenderness in my breasts."	-0.055, 0.425	0.040, 0.565
"I have the feeling of edema."	0.213, 0.002**	0.149, 0.031**
"My appetite is increasing."	0.152, 0.028**	0.004, 0.950
"My acne is increasing."	-0.069, 0.319	-0.065, 0.351
"I'm having a headache."	0.134, 0.053	0.186, 0.007**
"I am having sleep problems."	0.210, 0.002**	0.204, 0.003**
"I am constipated."	0.197, 0.004**	0.073, 0.294
Psychological symptoms		
"I feel irritable."	0.164, 0.017**	0.177, 0.01**
"I feel anxious."	0.136, 0.048**	0.212, 0.02**
"I feel depressed."	0.135, 0.050	0.151, 0.028**
"I don't want to socialize."	0.152, 0.028**	0.210, 0.002**

The correlation between the amount of weight change (kg) in the premenstrual/menstrual period and the taste, body and mood change likert scores was compared with Bivariate Spearman's analysis, $p<0.05$, $p<0.01$***

Changes in the food preferences during the luteal and follicular phases

Table 4 indicates the changes in the food preferences of the participants. Chocolate was the only food cause an increase in craving for, and this craving remained same during menstruation. The participants reported that their craving for animal foods high in protein, such as cheese, yoghurt, meat, and eggs, did not increase. They expressed that they were indecisive about changes in their consumption of pastries, cakes, sherbet desserts, pies, and chips. Even there are some statistical differences in the changes of food preferences likert scores before and during menstruation, the result were the same in terms of statements.

4. DISCUSSION

Stated average weight gain of 1.2±0.5 kg (min. 0.5- max. 3 kg), craving for sweets, abdominal bloating, breast tenderness, irritability, and chocolate consumption all increased in the luteal phase in the present study. They had increase in abdominal bloating in both periods, and breast tenderness only in the luteal phase. There was a weak but positive correlation between the weight gain and the craving for salty flavour, edema, increased appetite, abdominal bloating, and some other changes during the luteal phase ($p<0.05$).

So far, studies have revealed that weight change was the most noticeable change of the women during the luteal and follicular phases. In the present study, 62.2% of the women reported weight gain (mean 1.2 kg) before menstruation. Another significant finding of the present study is that weight gain was positively correlated with an increased craving for salty flavour, and edema. It was determined that the periods with the highest fluctuations in body weight during the menstrual cycle were premenstrual and menstrual periods (Racine et al., 2013, pp.161-166). It's been indicated that body weight increases before menstruation but decreases during menstruation (Esin et al., 2016, pp.23-27; Kammoun et al., 2017, pp.33-37). Güngördü (2019, p.55) found an increase in body weight, body mass index and waist circumference before menstruation. Robinson and Watson (1965, pp.225-235) detected that the change in weight varied from 0.59 to 2.07 kg, and weight increased before menstruation and reduced on the eighth day after the first day of menstruation. In contrast to these findings, some studies observed that weight remained the same in these two periods, but the number of subjects in these studies was 9 and 13 (Piers et al., 1995, pp.296-302; Sophos et al., 1987, pp.201-211).

Table 4. Food preferences in the luteal phase and the follicular phase

Foods	**Luteal phase**	**Follicular phase**	**p***
	Mean ±SD	**Mean ±SD**	
"In my premenstrual/menstrual period, there is an increase in ……..consumption."			
Chocolate	3.79±1.1	3.71±1.2	0.059
Milky desserts	3.17±1.4	3.15±1.4	0.641
Pastry	2.91±1.4	2.79±1.5	0.023*
Cake	2.68±1.4	2.60±1.4	0.150
Baclava desserts	2.64±1.4	2.68±1.5	0.320
Nuts	2.54±1.4	2.42±1.4	0.012*
Borek	2.52±1.4	2.38±1.4	0.001*
Package Chips	2.47±1.4	2.35±1.4	0.014*
Biscuit	2.46±1.4	2.42±1.4	0.440
Pasta	2.45±1.3	2.29±1.3	0.001*
Fruit	2.39±1.3	2.32±1.3	0.203
Bread	2.18±1.3	2.04±1.2	0.001*
Cheese	2.06±1.2	1.97±1.2	0.054
Yogurt	2.05±1.2	1.93±1.1	0.003*
Red meat	2.03±1.2	1.99±1.2	0.468
Soda drinks	2.01±1.3	1.99±1.3	0.880
Pretzel, salty	2.01±1.2	1.97±1.2	0.374
Chicken	1.98±1.1	1.96±1.1	0.665
Vegetable	1.97±1.1	1.93±1.1	0.420
Milk	1.84±1.0	1.87±1.1	0.433
Egg	1.79±1.0	1.79±1.0	0.881
Legume	1.71±0.9	1.75±1.0	0.215

Water retention in the body (Golub et al., 1965, pp.89-94) and excessive carbohydrate consumption (Bowen and Grunberg, 1990, pp.287-291) have been reported to be associated

with this weight gain before menstruation. Sweet consumption takes place immediately before menstruation when oestrogen and progesterone levels rise (Bowen and Grunberg, 1990, pp.287-291). Water retention in the body before menstruation is explained by the mechanisms in which the release rate of the aldosterone hormone responsible for sodium and water retention increases during the luteal phase, reaches the highest level during menstruation, then decrease (Özçiftçi and Kızıltan, 2021, pp. 26-37), and in which the increase in the level of progesterone hormone during the luteal phase causes water retention in the body by affecting water excretion from the kidneys (O'Brien et al., 1980, pp.1161-1163). However, no significant correlation was found between progesterone levels and fluid retention in a prospective study with a one-year follow-up, and, contrary to expectations, fluid retention peaked on the first day of menstruation rather than before (White et al., 2011). In a review, the injection of oestradiol or progesterone (or both) had only a minor effect on the regulation of water and sodium and indeed, it was argued that instead of causing excess fluid or salt retention or loss in young, healthy women, these hormones altered the homeostatic set point at which these systems were regulated (Stachenfeld, 2008, pp.152-159). In the present study, a positive correlation was found between the craving for salty flavours and increases in weight, edema, and appetite during the luteal phase. The participants reported the increased craving for salty foods. Although this may not actually reflect increased salt consumption, this correlation suggests that the changes women feel reflect on their consuming habits.

It demonstrated that energy and macronutrient intake change cyclically, with the most significant changes generally occurring in the late luteal phase, with a daily average increase as 150 kcal (Kammoun et al., 2017, pp.33-37; Bowen and Grunberg, 1990, pp.287-291; Tarasuk and Beaton, 1991, pp. 442-447). A study reported that total daily calorie intake was 2164 kcal in the luteal phase and 1688 kcal in the follicular phase, and daily carbohydrate intake increased significantly in the luteal phase (309 g vs. 246 g) compared to the follicular phase. More significantly, it was determined that the main cause of this increase was snack intake rather than the main meals (Kammoun et al., 2017, pp.33-37). It was suggested that increasing calorie intake by 100 kcal during the luteal phase would result in five kilogram weight gain at the end of a year if all other variables remained constant (Bryant et al., 2006, pp.888-894). Another study reported that regardless of ovulation status, protein intake, particularly animal protein, and food cravings increased during the luteal phase (Gorczyca et al., 2016, pp.1181-1188). While most studies reported that energy, protein, fat, and carbohydrate intake increased during the luteal phase, they also stated that there was no change in the energy intake percentage of these macronutrients during the two phases (Martini et al., 1994, pp.895-899). Some studies have reported no changes in energy and macronutrient intake (Gorczyca et al., 2016, pp.1181-1188). No significant differences were determined between periods in studies conducted in populations similar to the present study, but sweet and chocolate consumption increased during menstruation (Hızlı Güldemir et al., 2020, pp.406-414), protein and carbohydrate intake decreased during menstruation, and high-fat consumption increased (Çukurovalı Soykurt et al.,

2017, pp.52-60). In addition, studies show that fat intake in the luteal phase is higher than during menstruation (Krishnan et al., 2018; Tada et al., 2017). These differences in studies can be explained as a small number of participants, comparison of different phases, or taking dietary records from a small number of cycles.

Increases were reported in appetite, as well as sweet, chocolate, salty, pastry, and snack food cravings during the luteal phase (Gorczyca et al., 2016, pp.1181-1188; Souza et al., 2018, pp.686-692). However, it was reported in a study comparing the late follicular and late luteal phases that the craving for chocolate and the amount consumed did not change, and that high-fat/high-complex carbohydrate and low-fat/high-protein foods were more preferred in the late luteal phase (McVay et al., 2021, pp.591-600). When the increase in the desire for sweets was examined, it was found that the women's desire for sweets with syrup before menstruation increased, followed by cocoa sweets and milk desserts (Güngördü, 2019, p.52). In the study of Oksay et al (2008, pp.157-164) cravings for sweet foods increased. In the present study, the women reported that their craving for animal foods high in protein, such as cheese, yoghurt, meat, and eggs, did not increase during both the luteal and follicular phases. They also stated that, although their craving for sweets and chocolate increased, they were undecided about changes in their consumption of high-carbohydrate bakery products and pies, as well as non-chocolate desserts, such as cake, sherbet desserts, and chips, a salty carbohydrate. We can deduce from these findings that women's elevated sweet cravings are also selective. Tomelleri and Grunewald (1987, pp.311-315) determined that chocolate was the only high-carb food that is more appealing during menstruation than at other times and cravings for high-sugar and starchy foods did not change throughout the cycle phases. In general, craving for chocolate was higher in women than men and this indicates that this difference is physiological. Some physiological changes that take place before menstruation may induce the need for certain factors, such as magnesium or serotonin, and these two are available in chocolate, so chocolate may meet this increased need. Another explanation is that some substances in chocolate produce pleasure either directly (e.g., anandamide, cannabinoids) or indirectly through neurotransmitter release (e.g., endogenous opioids) (Bruinsma and Taren, 1999, pp.1249-1256). In this case, given the psychological changes that women go through during the luteal phase, it is understandable that chocolate consumption increases for these reasons. The perceptual qualities of chocolate and/or the perceiving chocolate as "special" may also be another factor for chocolate cravings (Rogers and Smit, 2000, pp.3-14). Because it has been found that the cravings did not disappear when chocolate is consumed as capsules that cannot be identified perceptually (Michener and Rozin, 1994, pp.419-422). Cultural differences have also been indicated to result in chocolate cravings (Zellner et al., 2004, pp.119-121). Chocolate is a high-calorie snack that is commonly consumed apart from main meals (Rogers and Smit, 2000, pp.3-14). In the light of the data that the calorie increases in women are primarily due to snacking, it would be more meaningful to make nutritional recommendations in this manner.

A common finding is an increase in appetite during the luteal phase. In a recent study, Ataman and Tan (2021, pp.302-315) found increase in appetite in the luteal phase. Studies conducted in populations similar to the present reported that the appetite during the luteal phase increased by 62%, 66.2%, and 70.2%, respectively, whereas it was 56.7% in the present study. In a similar study, an increase in appetite was found before menstruation in 82.50% of women (Güngördü, 2019, p.52). Another study found that both obese and non-obese women experienced increased appetite before menstruation (Arı, 2017, p.27). It is considered that this difference in the present study was associated with a considerably larger and broader age range of participants. Similar to the literature, it was determined that sweet taste and chocolate cravings increased in both phases, but this increase was lower in the follicular phase compared to the luteal phase. These food cravings may be associated with increased energy intake. Since cravings can be so important in managing obesity and its treatment, it is critical to understand whether cravings are associated with menstrual cycle hormones. It was stated that the increase in chocolate cravings, particularly associated with luteal phase may be associated with changes in ovarian hormone levels during the menstrual cycle. Food intake appears to increase during the luteal phase, when both oestrogen and progesterone levels rise, especially for sweet foods, whereas food intake seems to decrease during the follicular phase when only oestrogen levels rise (Kammoun et al., 2017, pp.33-37). In healthy normal-weight women, high oestradiol and oestradiol/leptin ratios in the luteal phase were associated with sweet taste and craving for carbohydrate-rich foods, as well as habitual sweet intake (Krishnan et al., 2016, pp.304-312). Varying steroid levels may cause fluctuations in carbohydrate consumption throughout the menstrual cycle. Carbohydrate consumption appears to be affected by the appetite suppressant effect of oestrogen (Dalvit, 1981, pp.1811-1815; Dalvit-McPhillips, 1983, pp.209-212).

The results of the present study cannot be generalised to all healthy women, but similar results to those in the current literature were obtained. The most important difference between the present study and these studies is that food preferences were studied as often eaten food and general food groups. The main limitations of this study are that it was a cross-sectional study, the age distribution of the participants was heterogeneous, and the thoughts about the increase in food cravings were expressed rather than actual behaviours. Since the study was conducted using an online survey, only the differences before and during menstruation were investigated, as the survey was designed to simply understand and give general and correct responses.

5. CONCLUSION

The present study indicated that women had changes in taste and food preferences, as well as physical and psychological changes in the luteal phase. The menstrual cycle should be assessed as an important factor into account when assessing nutritional status. Although there was little change in energy intake during the menstrual cycle, the overall conclusion is that energy intake increased during the luteal phase compared to the follicular phase. Despite an increase in macronutrient intake during the luteal phase, it was found that this increase was not

accompanied by major changes in the energy contribution percentages of macronutrients. However, in the literature, some findings are also inconsistent with the dietary intake changes during the cycle. It is apparent that food intake during the menstrual cycle has complex correlations, involving not only physiological and hormonal factors but also sensory or cultural influences. Consequently, regardless of the cause or extent of the difference, women undergo significant changes between these two phases and exhibit some behavioural changes to cope with these changes. Understanding these changes is of great importance for women's and menstrual health. Beside general dietary recommendation on menstrual cycle, person-centred care would be appreciated to cope with these changes.

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