Acta Scientiarum
http://periodicos.uem.br/ojs/acta
ISSN on-line: 1807-8648
Doi: 10.4025/actascihealthsci.v46i1.66963

Mindful eating is associated with body mass index and might affect food preferences in adults in the early pandemic

Yasemin Ertaş Öztürk* **and Pınar Sökülmez Kaya**

Department of Nutrition and Dietetics, Faculty of Health Sciences, Ondokuz Mayıs University, Atakum, Samsun, Türkiye. *Author for correspondence. E-mail: yasemnertas@gmail.com

ABSTRACT. This study aimed to show alterations in body mass index (BMI) and food preferences and their associations with eating behaviors in the early pandemic. Four hundred and forty-three adults participated in this study. Data were collected using a web-based survey within a month after social distancing onset. Self-reported body weight and height were used to obtain the BMI trend. Alterations in eating habits (snacking, eating out, and main meal number) were collected. The mindful eating questionnaire, Mediterranean diet assessment tool, emotional eating scale, and depression inventory were applied. Multiple linear regression models were set to predict factors on BMI. Food preferences were shown according to mindful eating groups. BMI, snacking, and sleep duration increased in both sexes during social distancing. Nearly half of the participants reported weight gain, while one-fifth lost weight. Being overweight (from 36.0 to 38.7% for men, from 17.7 to 18.8% for women, and obese (from 10.7 to 12.7% for men and from 4.4 to 5.8% for women) increased. Eating out and regular sports activities decreased. The mindful eating scores, negative emotional eating, and positive emotional eating were the predictors of BMI after adjustment for age, sex, and regular sports activity. The only significant factor was mindful eating for the altered BMI. Consumption of bread, grains, seeds, sweet, salty, and fatty snacks, canned foods, pastry, milk puddings, bakery goods, jam and honey, sugar-sweetened fruit juices, and carbonated beverages increased in the low- more than the high-mindful eating group. In conclusion, BMI altered even in the early pandemic. Mindful eating was the only significant factor in the BMI increase. High carbohydrate and fat-contained food groups were more frequently preferred among the low-mindful eating group. Therefore, setting mindfulness practices might prevent eating disorder risks and promote public health.

Keywords: body mass index; mindful eating; emotional eating; food groups; pandemic.

Received on February2, 2023.
Accepted on March23, 2023.

Introduction

Social distancing and a partial lockdown period have entered our lives after COVID-19 caused by a novel coronavirus emerged in Wuhan, China, in the last days of 2019 (World Health Organization [WHO], 2020b). The first case was declared in Türkiye on March 11, and schools were closed on March 16. After, social distancing precautions such as cancellations of social activities and job rotations have been applied. Eventually, on April 11, the first partial lockdown started and continued until June 2020 (Republic of Türkiye Ministry of Health, 2020). After lockdowns were over, social distancing continued. Social distancing was applied to decrease interactions between healthy and non-symptomatic or unidentified infected people in public. Closure of schools or working offices and cancellation of gatherings were social distancing precautions (Wilder-Smith & Freedman, 2020). Due to these precautions, staying at home includes distance education, home office work, and the limitation of outdoor and/or in-gym sports activities increased. Alterations in the work routine caused by the lockdowns and hearing or reading continuously about COVID-19 from mass/social media may result in boredom and be stressful (Di Renzo et al., 2020a).

In a study reviewing the earlier quarantine or pandemics (SARS, Ebola, the 2009 and 2010 H1N1 influenza pandemic, Middle East respiratory syndrome, and equine influenza), advanced social isolation or quarantine triggered anxiety and depression were reported (Brooks et al., 2020). Similarly, the present pandemic made people more anxious and depressed (Di Renzo et al., 2020b; Roy et al., 2020), prone to consume comfort foods and increased food intake related to emotional eating (Di Renzo et al., 2020b). Emotional eating behavior due to depression is associated with obesity and related health problems (Hawkins & Stewart, 2012; Konttinen, Strien, Mannisto, Jousilahti, & Haukkala, 2019). Moreover, eating attacks are frequent, especially when

individuals have negative emotions (Bilici, Ayhan, Karabudak, & Koksal, 2020), and depression is associated with unhealthy eating patterns (Paans et al., 2018, 2019). On the other hand, the Mediterranean diet is associated with lower depression; dietary modifications may affect the mood of individuals (Altun, Brown, Szoeke, & Goodwill, 2019). Therefore, mood and emotional eating behaviors should be considered to prevent obesity, leading to the risk of eating disorders (Touyz, Lacey, & Hay, 2020) and chronic diseases in the community.

In recent years, 'mindful eating', the awareness of individuals' eating behaviors, has come to the fore in reducing emotional eating behaviors and thus preventing diseases that may occur due to emotional eating (Alberts, Thewissen, & Raes, 2012). It is accepted as a modifiable factor in enhancing and maintaining healthy eating behaviors (Framson et al., 2009). In a recent cross-sectional study, mindful eating has been associated with both a lower level of depressive symptoms and a lower likelihood of having depression in three European countries (Winkens et al., 2018). Furthermore, mindfulness intervention decreased food cravings, emotional and external eating (Alberts et al., 2012).

During COVID-19 lockdowns, some studies showed significant alterations in food choices. According to a recent study in Italy, dietary changes have been reported, with 52.9% of participants increasing their total eating, 42.5% of them increased chocolate, ice cream, and desserts, 23.5% of them salty snacks and consequently, body weight gain during lockdown (Scarmozzino & Visioli, 2020). Furthermore, increased body mass index was associated with less frequent consumption of vegetables, fruit, and legumes during the COVID-19 quarantine and higher adherence to meat, dairy, and fast foods in Poland (Sidor & Rzymski, 2020). This situation supports the need to raise nutrition knowledge and control negative eating habits under expectable conditions. In the present study, we aimed to show early alterations in BMI, eating habits (snack number, meal number, and eating out) and, food preferences, sports activities, sleep duration and determine mindful eating, emotional eating, Mediterranean diet adherence, depression scores and showed their relationship with BMI in adults in the pandemic state.

Method

Subjects and study design

Adults over the age of 18-65 years participated in this study. We reached nearly 1500 possible participants using an anonymous link on social media. Finally, 443 adults (150 men and 293 women) completed the survey. The data were collected within two weeks, while the partial lockdown period began in April 2020. Participants were asked to self-evaluate their status from the beginning of social distancing, corresponding to about one month after the onset of social isolation. A questionnaire form was applied to participants consisting of demographic characteristics of individuals, statements about their height and body weight, information on nutritional behaviors (number of main meals, snacks, frequency of eating out), regular sports activities, Mindful eating questionnaire, Mediterranean diet assessment tool, emotional appetite questionnaire, and depression inventory. Ethical approval was obtained from the Ethics Committee of Ondokuz Mayis University (approval number: 2020/322) in accordance with the Declaration of Helsinki.

Anthropometric measurements

Individuals' height and body weight before and during the social distancing period were recorded based on their declaration. With these data, BMI (kg m^{-2}) = body weight (kg) / square of the height (m^2)) was calculated and assessed according to the World Health Organization obesity classification trough: <18.5 kg m^{-2} as underweight, 18.5-24.9 kg m^{-2} as normal, 25-29.9 kg m^{-2} as pre-obesity (overweight) and ⩾ 30 kg m^{-2} as obese (World Health Organization [WHO], 2020a).

Assessment of eating awareness and emotional eating

We assessed the eating awareness score of participants using the Turkish version ofthe 'Mindful eating questionnaire' developed originally by Framson et al. (2009). The validity and reliability of the questionnaire were studied by Köse, Tayfur, Bïrïncïoğlu and Dönmez (2016) and adapted to our culture with two new items (Cronbach alpha = 0.733). This version of the mindful eating questionnaire contains 30 items and seven subscales 1) disinhibition, 2) emotional eating, 3) control of eating, 4) eating discipline, 5) conscious nutrition, 6) mindfulness, and 7) interference awareness. A five-point Likert-type scale was used for scoring.

The increased score indicated higher awareness. The cut-off point of the questionnaire was 3 points. Sum of the seven subscales was divided into two groups: ⩾3 points showed a 'high-mindful eating score', and < 3 points as 'low-mindful eating score'.

We evaluated the emotional eating scores of individuals using the 'Emotional appetite questionnaire' developed by Nolan, Halperin and Geliebter (2010) and adopted by Demirel, Yavuz, Karadere, Şafak and Türkçapar (2014). The questionnaire contains 22 questions about the tendency to eat in response to positive and negative emotions (14 items) and situations (8 items). Each item is rated on a 9-point Likert-type scale with 'much less' and 'much more' as anchors, and five indicates 'the same'. The positive emotion and situation scores were summed to the 'positive appetite score', and the negative emotion and situation scores were calculated to the 'negative eating appetite score'. An increased score indicated a higher emotional appetite in response to positive or negative emotions.

Assessment of diet quality

A 14-item 'Mediterranean Diet Assessment Tool' was used to assess adherence to the Mediterranean diet as an indicator of diet quality. The tool was developed by Martinez-Gonzalez et al. (2012) and adapted by Özkan Pehlivanoğlu, Balcioğlu, & Ünlüoğlu (2020) to the Turkish language. Respondents can get a maximum of 14 points, and higher scores indicate higher compliance.

Assessment of food group consumption alterations

We used a questionnaire form to detect food group consumption changes. In this study, 27 food groups were questioned. Participants choose either 'increased', 'decreased', or 'not changed' options for each food group according to their transition in partial lockdown and social distancing period.

Assessment of depression

The Beck depression inventory developed by Beck, Ward, Mendelson, Mock and Erbaugh (1961) was applied to obtain the depression scores of participants. The inventory has 21 questions and four choices each. Scoring ranges from 0 to 3 for each question, and respondents can have a maximum of 63 points. Higher scores indicate an increased tendency toward depression. The inventory was validated by Hisli (1988, 1989).

Statistical analyses

Normality was assessed with the Kolmogorov-Smirnov test of numeric data and compared by sex by either independent samples t-test (if normally distributed) or Mann-Whitney U test (if non-normally distributed). All quantitative data were represented as mean±standard deviation and median (interquartile range). Wilcoxon test was to obtain differences in related data. Categorical data were analyzed using the Pearson chi-square test after weighing the factors. Multiple linear regression models were set to test independent variables (mindful eating, emotional eating scores, depression scores, and diet quality scores) as predictors of the BMI adjusted for covariates. All statistical analyses were performed with the SPSS version 22.0 statistical software package. The statistical significance level was selected as $p < 0.05$.

Results

Descriptive eating behavior features and depression status of participants are shown in Table 1. According to sex, men participants were a higher smoking proportion than women (38.0% vs. 20.8%, $p < 0.001$). After social distancing, the sleep duration of women was significantly higher than men (8.6 ± 1.67 hr vs. 8.2 ± 1.58 hr, $p = 0.035$). Women participants' Mediterranean diet adherence was significantly higher than men's (7.3 ± 2.19 vs. 6.8 ± 2.26, $p = 0.051$). Increased appetite for positive emotional feelings or states was significantly higher (42.9 ± 12.07 vs. 40.9 ± 11.20, $p = 0.011$), while depression scores were significantly lower in men (10.2 ± 9.50 vs. 13.6 ± 8.76, $p < 0.001$). Age, chronic disease status, sleep duration before social distancing, mindful eating score, and negative emotional appetite score were similar between both sexes ($p > 0.05$).

Alterations in BMI, sleep duration, meal habits, and regular sports activities after social distancing are shown in Table 2. Increased BMI and snacking, extended sleep duration, and decreased eating out were shown after social distancing. Main meal numbers were reduced in women, while such a pattern was not found in men.

Body weight changes and BMI classifications are shown in Figures 1 and 2. Nearly half of the women participants (48.3%) and 45.3% of the men participants reported increased body weight. On the other hand, 20.2% of the women and 22.0% of the men reported decreased body weight under social distancing (Figure 1). As shown in Figure 2, being underweight decreased, and being overweight or obese increased after social distancing in both sexes.

Table 1. Descriptive, eating behavior and depression properties according to sex.

Properties	Men (n = 150)	Women (n = 293)	Test value	p
Age (years)[a]	28.1 ± 7.69 27.0 (10.00)	27.1 ± 8.98 23.0 (13.00)	-1.321	0.187
Smoking (yes %)[b]	38.0 (57)	20.8 (61)	14.986	**<0.001**
Chronic disease (yes %)[b]	9.3 (14)	14.3 (42)	2.247	0.134
Regular sports activity (before, yes %) [b]	44.7 (67)	32.8 (96)	6.043	**0.014**
Regular sports activity (after, yes %) [b]	18.7 (28)	25.9 (76)	2.920	0.098
Sleep duration (before, hr)[a]	7.4 ± 1.16 7.8 (1.00)	7.4 ± 1.19 7.0 (1.00)	-0.734	0.463
Sleep duration (after, hr)[a]	8.2 ± 1.58 8.0 (3.00)	8.6 ± 1.67 8.0 (2.00)	-2.110	**0.035**
Mediterranean diet adherence [a]	6.8 ± 2.26 7.0 (3.00)	7.3 ± 2.19 7.0 (3.00)	-1.955	0.051
Mindful eating score [c]	3.4 ± 0.45 3.4 (0.63)	3.5 ± 0.48 3.5 (0.67)	-1.675	0.095
Negative emotional appetite score [a]	50.6 ± 19.34 52.0 (27.25)	50.9 ± 20.70 50.0 (29.50)	-0.398	0.691
Positive emotional appetite score [a]	42.9 ± 12.07 43.0 (10.25)	40.9 ± 11.20 40.0 (11.00)	-2.528	**0.011**
Depression score [a]	10.2 ± 9.50 8.0 (11.00)	13.6 ± 8.76 12.0 (11.00)	-4.803	**< 0.001**

Data represented as mean±standart deviation and median (interquartile range) or %. [a]Mann Whitney U test, [b]Pearson chi-square, [c]Independent samples t-test.

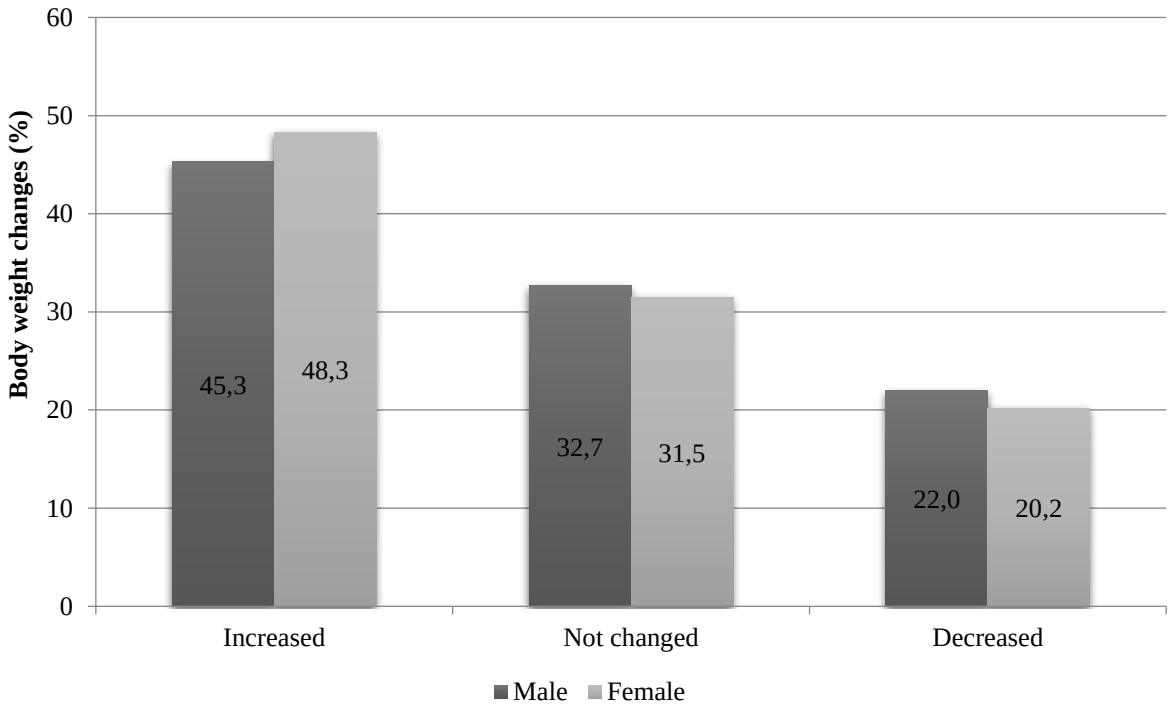

Figure 1. Body weight changes of men and women participants under social distancing.

Predictors of BMI (after) are shown in Table 3. In model 1, mindful eating and emotional eating scores were significant contributors to BMI (after) adjusted for age, sex, and regular sports activity ($p < 0.001$). In model 2, only the mindful eating scores significantly predict BMI (after) after further adjustment for BMI (before) in addition to sex, age, and regular sports activity ($p < 0.001$).

Table 2. Body mass index, sleep duration, and meal habits alterations after social distancing.

Properties[a]	Men (n = 150)		Z	p	Women (n = 293)		Z	p
	Before	After			Before	After		
Body mass index (kgm^{-2})	25.5±4.10 24.8 (4.69)	25.7±4.14 25.0 (4.78)	-2.400	**0.016**	22.8±3.69 22.3 (4.62)	23.0±3.74 22.4 (4.81)	-3.657	**<0.001**
Sleep duration (hr)	7.4±1.16 7.8 (1.00)	8.2±1.58 8.0 (3.00)	-5.548	**<0.001**	7.4±1.19 7.0 (1.00)	8.6±1.67 8.0 (2.00)	-9.840	**<0.001**
Main meal number	2.4±0.63 2.0 (1.00)	2.4±0.65 2.0 (1.00)	-0.248	0.804	2.5±0.57 3.0 (1.00)	2.4±0.55 2.0 (1.00)	-2.923	**0.003**
Snack number	1.2±0.96 1.0 (1.00)	1.6±1.19 1.0 (1.00)	-5.243	**<0.001**	1.5±0.97 1.0 (1.00)	2.1±1.27 2.0 (2.00)	-7.621	**<0.001**
Eating out	2.5±2.47 2.0 (2.00)	0.5±1.57 0.0 (0.00)	-8.422	**<0.001**	2.2±2.31 2.0 (2.00)	0.2±0.57 0.0 (0.00)	-12.597	**<0.001**

Data represented as mean±standart deviation and median (interquartile range) for quantitative data. [a]Wilcoxon test.

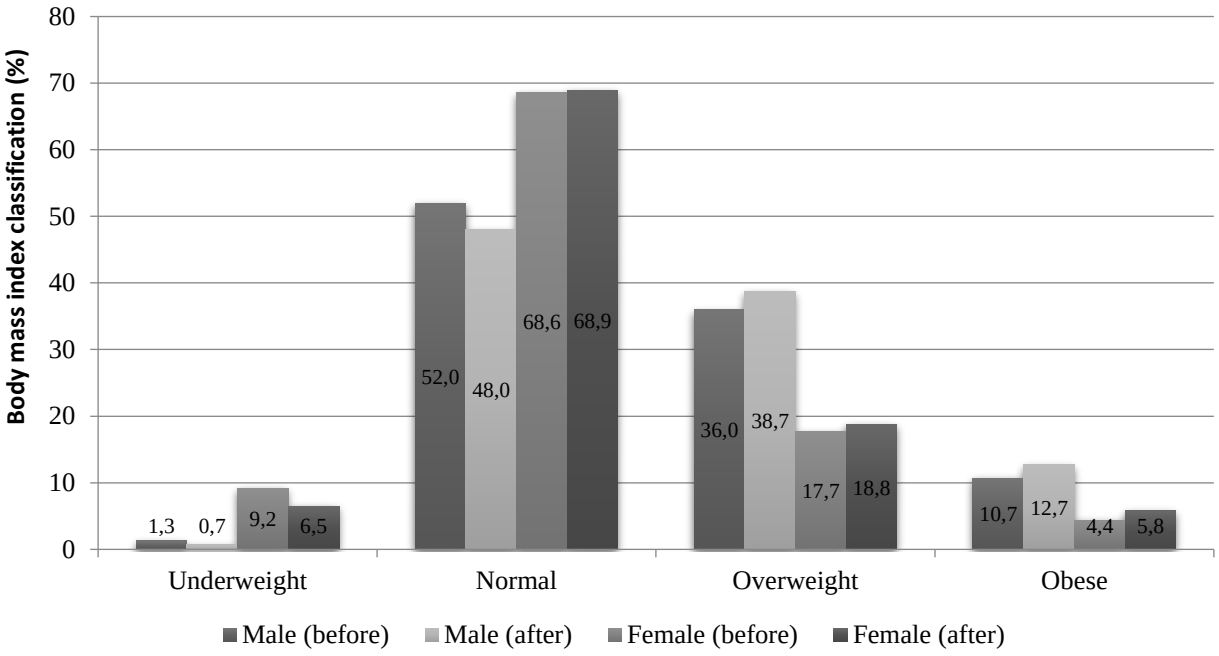

Figure 2. Body mass index classification before and after social distancing according to sex.

Table 3. Multiple linear regression analysis for the predictors of BMI (after) (n = 443).

Parameters	β	95% CI	p
Model 1			
Mindful eating	-0.176	-2.336, -0.702	**< 0.001**
Negative emotional appetite	0.123	0.007, 0.042	**0.006**
Positive emotional appetite	-0.144	-0.070, -0.011	**0.007**
Depression	-0.003	-0.042, 0.039	0.948
Diet quality	-0.033	-0.213, 0.091	0.432
Model 2			
Mindful eating	-0.057	-0.658, -0.319	**< 0.001**
Negative emotional appetite	0.007	-0.002, 0.005	0.461
Positive emotional appetite	0.008	-0.003, 0.009	0.373
Depression	-0.004	-0.010, 0.006	0.652
Diet quality	0.005	-0.022, 0.041	0.543

BMI: Body mass index, β: Regression coefficient, Cl: Confidence interval. Model 1 is adjusted for age, sex, regular sports activity (after). Model 2 is adjusted for age, sex, regular sports activity (after), and BMI (before).

Table 4 shows food group preferences according to mindful eating score. We found statistically significant alterations in the egg, vegetables, bread, grains, seeds, sweet snacks, salty snacks, fatty snacks, canned foods, pastry, milk puddings, bakery goods, jam/honey, sugar-sweetened fruit juices, carbonated beverages, and coffee consumptions between low and high-mindful eating groups ($p < 0.05$).

Table 4. Consumption alterations of food groups according to mindful eating score (%).

Food groups [a]	Low mindful eating score (n=70)			High mindful eating score (n=373)			Chi-square	p
	Increased	Decreased	Not changed	Increased	Decreased	Not changed		
Milk and yogurt (%)	37.1	10.0	52.9	36.5	3.8	59.8	5.341	0.068
Cheese (%)	37.1	4.3	58.6	31.6	3.5	64.9	1.022	0.672
Egg (%)	55.7	2.9	41.4	36.3	7.0	56.7	9.771	**0.008**
Red meat (%)	22.9	15.7	61.4	25.5	12.9	61.7	0.519	0.786
Poultry (%)	22.9	18.6	58.6	21.7	16.4	61.9	0.317	0.852
Fish and seafood (%)	4.3	22.9	72.9	12.6	20.1	67.3	4.095	0.138
Vegetables (%)	48.6	14.3	37.1	46.6	5.4	48.0	8.476	**0.013**
Fresh fruits (%)	44.3	7.1	48.6	48.8	7.0	44.2	0.498	0.772
Dry fruits (%)	22.9	14.3	62.9	21.4	9.1	69.4	2.013	0.364
Bread (%)	65.7	1.4	32.9	26.4	16.4	57.2	44.236	**0.000**
Grains (%)	55.7	1.4	42.9	28.4	6.7	64.9	20.865	**0.000**
Legumes (%)	32.9	2.9	64.3	26.8	4.3	68.9	1.258	0.564
Nuts (%)	44.3	4.3	51.4	33.2	6.4	60.3	3.291	0.190
Seeds (%)	45.7	10.0	44.3	26.8	11.0	62.2	10.308	**0.005**
Sweet snacks (%)	61.4	2.9	35.7	42.6	16.4	41.0	12.531	**0.002**
Salty snacks (%)	47.1	5.7	47.1	23.3	16.4	60.3	18.649	**0.000**
Fatty snacks (%)	35.7	8.6	55.7	13.7	18.2	68.1	21.349	**0.000**
Canned food (%)	24.3	4.3	71.4	8.0	9.7	82.3	17.449	**0.000**
Pastry (%)	44.3	8.6	47.1	16.6	21.4	61.9	28.682	**0.000**
Milk puddings (%)	47.1	10.0	42.9	31.9	12.3	55.8	6.085	**0.050**
Bakery goods (%)	67.1	10.0	22.9	43.4	14.5	42.1	13.465	**0.001**
Jam and honey (%)	61.4	1.4	37.1	32.2	8.3	59.5	22.847	**0.000**
Fruit juices (sugar sweetened) (%)	21.4	14.3	64.3	7.2	17.2	75.6	13.831	**0.001**
Carbonated beverage (%)	24.3	25.7	50.0	9.7	18.5	71.8	16.227	**0.000**
Tea (%)	64.3	5.7	30.0	52.8	5.6	39.7	3.401	0.182
Coffee (%)	58.6	11.4	30.0	38.0	15.2	46.8	10.326	**0.006**
Alcohol (%)	10.0	10.0	80.0	5.4	8.6	86.1	2.470	0.289

[a]Pearson chi-square test.

Discussion

The present study had two main objectives: (1) to determine the body weight, BMI, and trends in eating habits, food preferences, sleep duration, and regular sports activities of the Turkish adult population during social distancing in the COVID-19 pandemic and (2) to assess mindful eating, emotional eating, adherence to Mediterranean diet quality and depression levels and possible relations with BMI and diet quality.

In the present study, our results showed that BMI was elevated in both sexes during social distancing. We found a transition in overall overweight and obese individuals from 36.0 to 38.7% for overweight and from 10.7 to 12.7% for obese male participants and from 17.7 to 18.8% for overweight and from 4.4 to 5.8% for obese females. During this period, not every volunteer reported an increase in body weight. Likewise, several studies have shown similar trends concluding obesity has increased during pandemics in different world regions (Di Renzo et al., 2020a; Pellegrini et al., 2020; Sidor & Rzymski, 2020; Zachary et al., 2020). In Italy, 37.4% of the study population reported a stable weight, whereas 13.9% believed to have lost weight, 40.3% felt weight gain slightly, and 8.3% gained weight dramatically (Di Renzo et al., 2020a). In another study, patients with obesity showed a ≈1.5 kg self-reported weight gain after the first month of lockdown (Pellegrini et al., 2020). Similarly, 29.9 and 18.6% of individuals in Poland reported increasing and decreasing body weight, respectively. Interestingly, their results showed underweight people lost weight, and obese ones gained more in this period (Sidor & Rzymski, 2020), suggesting that eating problems could occur or worsen under challenging circumstances.

Obesity is an independent predictor of a poor prognosis of COVID-19 (Tamara & Tahapary, 2020). Obese people affected by COVID-19 stay longer in hospitals and get more intensive and extended oxygen treatment (Moriconi et al., 2020). Furthermore, an increase in obesity will be associated with a rise in the cardiovascular risk burden (Mattioli, Pinti, Farinetti, & Nasi, 2020). Therefore, it is crucial to determine the relative risk factors leading to obesity. In the present study, associated factors with BMI were; low eating awareness and increased eating in response to negative emotions, and decreased eating in response to positive emotions after adjusting for age, sex, and regular sports activity. When BMI (before) was adjusted, mindful eating remained the only contributor to BMI (after). This showed that the alteration of BMI was only mediated by mindful eating behaviors in the early pandemic state. The emotional conditions significantly affect eating

behavior, e.g., increased eating attacks were observed, particularly in people under negative emotions or situations (Bilici et al., 2020). In a recent study, 86.0% of respondents failed to control their diet because of isolation, lack of stimuli, boredom, and alterations in their food routines (Di Renzo et al., 2020). In a study from our country, emotional eating was lower in the individuals with no change in their body weight than those who gained or lost weight (Serin & Koç, 2020). Self-reported anxiety/depression situation was strongly associated with weight gain in predicting an increase in body weight after adjusting for consuming unhealthy foods (Pellegrini et al., 2020). However, studies are conflicting on whether depression and eating styles are independently associated with dietary intake or whether associations between depression and dietary intake are mediated by eating styles. Strien, Konttinen, Homberg, Engels and Winkens (2016) showed depression is a mediator between emotional eating and obesity, while Paans et al. (2019) indicated as depression and eating styles contributed independently to decreased diet quality and higher intake of sweet and snack/fast-food. After all, in both situations, depression can cause obesity by either emotional eating or influencing diet quality; therefore, mood and driving factors should be considered. Mindful eating practices can be an effective tool, as indicated higher scores were associated with lower depression symptoms (Winkens et al., 2018). Besides, mindfulness based approaches help prevent weight gain and decreased food consumption in obesity environment (Warren, Smith, & Ashwell, 2017) suggesting mindful eating potentially encourages people to limit emotional eating and thus control themselves to gain weight.

In this study, we found a decreased frequency in the eating out habits; however, increased snacking by both sexes after social distancing with a higher means in the women. Increased stress is associated with elevated snacking behaviors. In previous work, opportunity-induced eating and coping with negative emotions were related to increase snacking, and women were more affected by this phenomenon (Verhoeven, Adriaanse, Vet, Fennis, & Ridder, 2015). This situation has logic under lockdown since people have much time and are emotionally depressed. Zachary et al. (2020) showed that risk factors for weight gain during self-quarantine are snacking after dinner, lack of dietary restraint, eating in response to stress, and reduced physical activity. Similarly, our results stated altered regular sports activities in the present study. Participants had significantly fewer sports activities during the lockdown. In France, physical inactivity was reported by more than a quarter of the respondents, and difficulties in managing food intake because of stress, emptiness, and boredom among participants (Cherikh et al., 2020). Since physical activity can enhance the functionality of immune cells, the immune system should be supported by appropriate physical activity, which will fight against viral factors. Moderate-intensity but not high-intensity exercise has been reported as an efficient way to cope with the COVID-19 virus (Rahmati-Ahmadabad & Hosseini, 2020).

Most of European countries have published dietary guidelines for the COVID-19 pandemic in special suggested eating a well-balanced diet, focused on adequate vegetables, fruits, whole grains, legumes, and limited high-calorie and low-nutritious foods (European Federation of the Associations of Dietitians [EFAD], 2023). Such a diet is known to maintain optimal body weight and provide essential dietary substances to boost the immune system (Abbas & Kamel, 2020; Butler & Barrientos, 2020). During lockdowns, food consumption changed, and these changes were shown to be both positive and negative. In a multicenter 'Effects of home Confinement on multiple Lifestyle Behaviours during the COVID-19 outbreak' (ECLB-COVID19) study, participants from different continents reported increased snacking and unhealthy dietary habits after the lockdown (Ammar et al., 2020). In Portuguese, 45.2% of adults indicated higher food frequency and larger quantities of nearly one out of three participants (Antunes et al., 2020). In another study, the consumption of homemade sweets, pizza, bread, cereals, and hot beverages increased in the Italian sample. In contrast, savory snacks, snacks, processed meat, and carbonated and sweet drinks decreased. Furthermore, increased intake of white meat, legumes, eggs, dairy products, milk and yogurts, and fresh vegetables was reported in the same study (Di Renzo et al., 2020b), suggesting some healthy preferences have been made at the same time. Italians indicated that half the respondents increased eating, and 21.2% of responders upped fresh fruit and vegetable intakes and increased tea, coffee, and herbal tea consumption. At the same time, 23.5% of participants reported more sweet and salty snack consumption during the lockdown (Scarmozzino & Visioli, 2020). On the other hand, in a Poland study, authors stated a critical finding suggesting obese subjects were most prone to adverse dietary modification due to lockdowns. It results in increased food consumption and snacking; the lowest frequency of daily fruit, vegetable, and legume consumption; and the most significant tendency to consume meat, sweets, salty snacks, and fast foods every day (Sidor & Rzymski, 2020). In addition, in the Chinese population, healthy choices increased by 31.3, 27.5, and 21.1% of the participants were reported for vegetables, fruits and whole grains, respectively, in people with a relatively higher educational background

and better knowledge and attitudes towards food safety and nutrition (Luo et al., 2020). Similarly, our results showed healthy food groups, such as milk and yogurt, egg, vegetables, fresh fruit, and legumes, were increased by at least nearly 30% of participants in both groups. However, exceptionally high carbohydrate and fat-dense food groups were significantly preferred by the low-mindful eating group over the high-mindful eating group, e.g., sweet snacks (61.4 vs. 42.6%), salty snacks (47.1 vs. 23.3%), fatty snacks (35.7 vs. 13.7%), canned foods (24.3 vs. 8.0%), pastry (44.3 vs. 16.6%), milk puddings (47.1 vs. 31.9%), bakery goods (67.1 vs. 43.4%), jam/honey (61.4 vs. 32.2%), sugar-sweetened fruit juice (21.4 vs. 7.2%), carbonated beverage (24.3 vs. 9.7), bread (65.7 vs. 26.4%) and grains (55.7 vs. 2.4%). Our results showed both groups altered their preferences during the pandemic; however, the high-mindful eating group seemed better at controlling themselves. In a recent study, people were received personalized nutritional advice reported eating more (40%), not paying attention to the healthiness of the consumed food (28%), consuming more sweets (50%), more snacks (33%), more frozen/canned foods (17%), and less fruit and vegetables than before (18%) (Pellegrini et al., 2020) indicating how hard to maintain healthy choices.

The present study has several limitations. Firstly, we collected data by a self-reported questionnaire, in which we may take subjective answers, and our study's cross-sectional nature failed to give a casualty. The dependent variables (BMI values) were calculated by self-reported body weight and height. However, this was the safest way to collect data during the pandemic under social distancing. Similarly to that, most of the pandemic studies have the same design and so bias. Another limitation is that we got diet quality scores from a short questionnaire form and did not take food consumption records or frequency questionnaires. Because the lockdown continued during the Ramadan fasting, we did not want to include its effects on eating behavior and closed the survey before Ramadan began. Since we collect data using a web-based survey, we choose not to extend participants' time on the study and thus avoid uncompleted surveys. The strength of our research is we collected data using valid and reliable indices and explored that eating awareness might be a possible coping strategy.

Conclusion

In conclusion, our findings showed social distancing had changed eating habits, sports activities, and emotional states within even a short duration. Obesity increased in both sexes. BMI was associated with an individual's eating awareness and negative or positive emotions. However, the BMI values transition in the early pandemic only mediated mindful eating. Additionally, unhealthy food preferences were higher in the low-mindful eating group. Therefore, nutrition education, enhancing mindful eating practices, and home exercise practices may help maintain optimum body weight and promote health in such challenging times.

References

Abbas, A. M., & Kamel, M. M. (2020). Dietary habits in adults during quarantine in the context of COVID-19 pandemic. *Obesity Medicine, 19*, 100254. DOI: https://doi.org/10.1016/j.obmed.2020.100254.

Alberts, H. J. E. M., Thewissen, R., & Raes, L. (2012). Dealing with problematic eating behaviour. The effects of a mindfulness-based intervention on eating behaviour, food cravings, dichotomous thinking and body image concern. *Appetite, 58*(3), 847-851. DOI: https://doi.org/10.1016/j.appet.2012.01.009.

Altun, A., Brown, H., Szoeke, C., & Goodwill, A. M. (2019). The Mediterranean dietary pattern and depression risk: A systematic review. *Neurology, Psychiatry and Brain Research, 33*, 1-10. DOI: https://doi.org/10.1016/j.npbr.2019.05.007.

Ammar, A., Brach, M., Trabelsi, K., Chtourou, H., Boukhris, O., Masmoudi, L., ... Hoekelmann, A. (2020). Effects of COVID-19 home confinement on eating behaviour and physical activity: results of the ECLB-COVID19 international online survey. *Nutrients, 12*(6). DOI: https://doi.org/10.3390/nu12061583.

Antunes, R., Frontini, R., Amaro, N., Salvador, R., Matos, R., Morouco, P., & Rebelo-Goncalves, R. (2020). Exploring lifestyle habits, physical activity, anxiety and basic psychological needs in a sample of portuguese adults during COVID-19. *International Journal of Environmental Research and Public Health, 17*(12). DOI: https://doi.org/10.3390/ijerph17124360.

Beck, A. T., Ward, C., Mendelson, M., Mock, J., & Erbaugh, J. (1961). Beck depression An inventory for measuring depression. *Archives of General Psychiatry, 4*, 561-571.

Bilici, S., Ayhan, B., Karabudak, E., & Koksal, E. (2020). Factors affecting emotional eating and eating palatable food in adults. *Nutrition Research and Practice, 14*(1), 70-75. DOI: https://doi.org/10.4162/nrp.2020.14.1.70.

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet, 395*(10227), 912-920. DOI: https://doi.org/10.1016/s0140-6736(20)30460-8.

Butler, M. J., & Barrientos, R. M. (2020). The impact of nutrition on COVID-19 susceptibility and long-term consequences. *Brain, Behavior, and Immunity, 87*, 53-54. DOI: https://doi.org/10.1016/j.bbi.2020.04.040.

Cherikh, F., Frey, S., Bel, C., Attanasi, G., Alifano, M., & Iannelli, A. (2020). Behavioral food addiction during lockdown: time for awareness, time to prepare the aftermath. *Obesity Surgery, 30*(9), 3585-3587. DOI: https://doi.org/10.1007/s11695-020-04649-3.

Demirel, B., Yavuz, K. F., Karadere, M. E., Şafak, Y., & Türkçapar, M. H. (2014). Duygusal İştah Anketi'nin Türkçe geçerlik ve güvenilirliği, beden kitle indeksi ve duygusal şemalarla ilişkisi. *Bilişsel Davranışçı Psikoterapi ve Araştırmalar Dergisi*, *3*, 171-181.

Di Renzo, L., Gualtieri, P., Pivari, F., Soldati, L., Attina, A., Cinelli, G., ... De Lorenzo, A. (2020a). Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. *Journal of Translational Medicine, 18*(1), 229. DOI: https://doi.org/10.1186/s12967-020-02399-5.

Di Renzo, L., Gualtieri, P., Cinelli, G., Bigioni, G., Soldati, L., Attina, A., ... De Lorenzo, A. (2020b). Psychological aspects and eating habits during COVID-19 home confinement: Results of EHLC-COVID-19 italian online survey. *Nutrients, 12*(7). DOI: https://doi.org/10.3390/nu12072152.

European Federation of the Associations of Dietitians [EFAD]. (2023). *Public health nutrition during COVID*. Retrieved from https://www.efad.org/covid-19-resources-research-and-information/public-health-nutrition/

Framson, C., Kristal, A. R., Schenk, J. M., Littman, A. J., Zeliadt, S., & Benitez, D. (2009). Development and validation of the mindful eating questionnaire. *Journal of the Academy of Nutrition and Dietetics, 109*(8), 1439-1444. DOI: https://doi.org/10.1016/j.jada.2009.05.006.

Hawkins, M. A. W., & Stewart, J. C. (2012). Do negative emotional factors have independent associations with excess adiposity? *Journal of Psychosomatic Research, 73*(4), 243-250. DOI: https://doi.org/10.1016/j.jpsychores.2012.07.009.

Hisli, N. (1988). Beck Depresyon Envanterinin gecerliligi uzerine bir calisma (A study on the validity of Beck Depression Inventory). *Psikoloji Dergisi, 6*, 118-122.

Hisli, N. (1989). Beck depresyon envanterinin universite ogrencileri icin gecerliligi, guvenilirligi.(A reliability and validity study of Beck Depression Inventory in a university student sample). *Journal of Psychology, 7*, 3-13.

Konttinen, H., Strien, T. van, Mannisto, S., Jousilahti, P., & Haukkala, A. (2019). Depression, emotional eating and long-term weight changes: a population-based prospective study. *International Journal of Behavioral Nutrition and Physical Activity, 16*(28). DOI: https://doi.org/10.1186/s12966-019-0791-8.

Köse, G., Tayfur, M., Bïrïncïoğlu, İ., & Dönmez, A. (2016). Adaptation study of the Mindful Eating Questiıonnare (MEQ) into Turkish. *Journal of Cognitive-Behavioral Psychotherapy and Research, 5*(3), 125-134. DOI: https://doi.org/10.5455/JCBPR.250644.

Luo, Y., Chen, L., Xu, F., Gao, X., Han, D., & Na, L. (2020). Investigation on knowledge, attitudes, and practices about food safety and nutrition in the Chinese during the epidemic of corona virus disease 2019. *Public Health Nutrition, 24*(2), 267-274. DOI: https://doi.org/10.1017/S1368980020002797.

Martinez-Gonzalez, M. A., Garcia-Arellano, A., Toledo, E., Salas-Salvado, J., Buil-Cosiales, P., Corella, D., ... Estruch, R. (2012). A 14-item Mediterranean diet assessment tool and obesity indexes among high-risk subjects: the PREDIMED trial. *PLoS One, 7*(8), e43134. DOI: https://doi.org/10.1371/journal.pone.0043134.

Mattioli, A. V., Pinti, M., Farinetti, A., & Nasi, M. (2020). Obesity risk during collective quarantine for the COVID-19 epidemic. *Obesity Medicine, 20*, 100263.DOI: https://doi.org/10.1016/j.obmed.2020.100263.

Moriconi, D., Masi, S., Rebelos, E., Virdis, A., Manca, M. L., De Marco, S., ... Nannipieri, M. (2020). Obesity prolongs the hospital stay in patients affected by COVID-19, and may impact on SARS-COV-2 shedding. *Obesity Research & Clinical Practice, 14*(3), 205-209. DOI: https://doi.org/10.1016/j.orcp.2020.05.009.

Nolan, L. J., Halperin, L. B., & Geliebter, A. (2010). Emotional Appetite Questionnaire. Construct validity and relationship with BMI. *Appetite, 54*(2), 314-319. DOI: https://doi.org/10.1016/j.appet.2009.12.004.

Özkan Pehlivanoğlu, E. F., Balcioğlu, H., & Ünlüoğlu, İ. (2020). Turkish Validation and Reliability of Mediterranean Diet Adherence Screener. *Osmangazi Journal of Medicine, 42*(2), 160-164.

Paans, N. P. G., Gibson-Smith, D., Bot, M., Strien, T. van, Brouwer, I. A., Visser, M., & Penninx, B. W. J. H. (2019). Depression and eating styles are independently associated with dietary intake. *Appetite, 134*, 103-110. DOI: https://doi.org/10.1016/j.appet.2018.12.030.

Paans, N. P. G., Bot, M., Brouwer, I. A., Visser, M., Roca, M., Kohls, E., ... Penninx, B. W. J. H. (2018). The association between depression and eating styles in four European countries: The MooDFOOD prevention study. *Journal Psychosomatic Research, 108*, 85-92. DOI: https://doi.org/10.1016/j.jpsychores.2018.03.003.

Pellegrini, M., Ponzo, V., Rosato, R., Scumaci, E., Goitre, I., Benso, A., ... Bo, S. (2020). Changes in weight and nutritional habits in adults with obesity during the "Lockdown" period caused by the COVID-19 virus emergency. *Nutrients, 12*(7). DOI: https://doi.org/10.3390/nu12072016.

Rahmati-Ahmadabad, S., & Hosseini, F. (2020). Exercise against SARS-CoV-2 (COVID-19): Does workout intensity matter? (A mini review of some indirect evidence related to obesity). *Obesity Medicine, 19*, 100245. DOI: https://doi.org/10.1016/j.obmed.2020.100245.

Republic of Türkiye Ministry of Health (2020). *COVID-19 Situation Report*. Retrieved from https://sbsgm.saglik.gov.tr/TR,66424/covid-19-situation-report-turkey.html

Roy, D., Tripathy, S., Kar, S. K., Sharma, N., Verma, S. K., & Kaushal, V. (2020). Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian Journal of Psychiatry, 51*, 102083. DOI: https://doi.org/10.1016/j.ajp.2020.102083.

Scarmozzino, F., & Visioli, F. (2020). Covid-19 and the Subsequent Lockdown Modified Dietary Habits of Almost Half the Population in an Italian Sample. *Foods, 9*(5), 675. DOI: https://doi.org/10.3390/foods9050675.

Serin, E., & Koç, M. C. (2020). Examination of the eating behaviors and depression states of the university students who stay at home during the coronavirus pandemic in terms of different variables. *Progress in Nutrition, 22*(1), 33-43. DOI: https://doi.org/10.23751/pn.v22i1-S.9780.

Sidor, A., & Rzymski, P. (2020). Dietary choices and habits during COVID-19 lockdown: experience from Poland. *Nutrients, 12*(6), 1657. DOI: https://doi.org/10.3390/nu12061657.

Strien, T. van, Konttinen, H., Homberg, J. R., Engels, R. C. M. E., & Winkens, L. H. H. (2016). Emotional eating as a mediator between depression and weight gain. *Appetite, 100*, 216-224. DOI: https://doi.org/10.1016/j.appet.2016.02.034.

Tamara, A., & Tahapary, D. L. (2020). Obesity as a predictor for a poor prognosis of COVID-19: A systematic review. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 14*(4), 655-659. DOI: https://doi.org/10.1016/j.dsx.2020.05.020.

Touyz, S., Lacey, H., & Hay, P. (2020). Eating disorders in the time of COVID-19. *Journal of Eating Disorders, 8*(19). DOI: https://doi.org/10.1186/s40337-020-00295-3.

Verhoeven, A. A. C., Adriaanse, M. A., Vet, E., Fennis, B. M., & Ridder, D. T. D. (2015). It's my party and I eat if I want to. Reasons for unhealthy snacking. *Appetite, 84*, 20-27. DOI: https://doi.org/10.1016/j.appet.2014.09.013.

Warren, J. M., Smith, N., & Ashwell, M. (2017). A structured literature review on the role of mindfulness, mindful eating and intuitive eating in changing eating behaviours: effectiveness and associated potential mechanisms. *Nutrition Research Reviews, 30*(2), 272-283. DOI: https://doi.org/10.1017/S0954422417000154.

Wilder-Smith, A., & Freedman, D. O. (2020). Isolation, quarantine, social distancing and community containment: pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak. *Journal of Travel Medicine, 27*(2). DOI: https://doi.org/10.1093/jtm/taaa020.

Winkens, L. H. H., Strien, T. van, Brouwer, I. A., Penninx, B. W. J. H., Visser, M., & Lahteenmaki, L. (2018). Associations of mindful eating domains with depressive symptoms and depression in three European countries. *Journal of Affective Disorders, 228*, 26-32. DOI: https://doi.org/10.1016/j.jad.2017.11.069.

World Health Organization [WHO]. (2020a). *Body mass index-BMI*. Retrieved from https://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/body-mass-index-bmi

World Health Organization [WHO]. (2020b). *Coronavirus disease (COVID-19) pandemic*. Retrieved from https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19#:~:text=WHO%20announced%20COVID%2D19,on%2011%20March%202020.

Zachary, Z., Forbes, B., Lopez, B., Pedersen, G., Welty, J., Deyo, A., & Kerekes, M. (2020). Self-quarantine and weight gain related risk factors during the COVID-19 pandemic. *Obesity Research & Clinical Practice, 14*(3), 210-216. DOI: https://doi.org/10.1016/j.orcp.2020.05.004.