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Original article

Emotional eating behaviors during the COVID-19 pandemic: A cross-sectional study



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SUMMARY

Background & aims: The study aimed to evaluate emotional eating tendency of Turkish individuals during COVID-19 pandemic.

Methods: The study comprised an online questionnaire and it was conducted from August to September 2020. The survey was distributed through social networks.

Results: A total of 1626 adults have been included in the study, aged between 18 and 65 years (69.6% females and 30.4% males). The average BMI of all participants was 24.4 ± 4.7 kg/m², 6% were underweight, and 11.6% were obese. A total of 32.7% of the participants had an increase in appetite and 34.4% had a weight gain. It was found that most of the participants (75.7%) were emotional eaters at different levels. Emotional eating was more common in obese people (43.5%) than normal weight (33.5%) and underweight (18.4%) people. It was examined the increasing food intake according to the BMI, the obese increased the consumption of fresh vegetables, fruits, pastries, and, eggs; underweight increased the consumption of fresh vegetables and fruits, milk and, eggs. As in other countries, a weight gain was observed in the individuals. However, the participants resorted to emotional eating to cope with negative emotions such as depression, anxiety, and stress caused by the pandemic.

Conclusions: In this study, it has been provided preliminary data that can be used in future studies to determine the emotional eating behaviors during the COVID-19 pandemic.

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1. Introduction

COVID-19 has been declared as a global health emergency on the 30th January 2020 by the WHO Emergency Committee [1]. The first case of COVID-19 in Turkey was reported on 11th March 2020, and then the number of cases increased rapidly. On the 3rd July 2021, a total of 5.440.368 cases and 49.874 deaths were reported in Turkey [2]. As a result of the increasing number of cases, during weekends and public holidays, bans were imposed for leaving the house; the ban was imposed for a maximum of four consecutive days.

Due to the measures of COVID-19, a drastic change has occurred in the lifestyles and habits of the individuals. Self-isolation and

lockdown on some days strongly impacted both economic and psychological aspects, in particular affecting eating habits [3].

Limited access to daily grocery shopping has led to reduce the consumption of fresh fruit and vegetables and increased the highly processed food with long shelf life. The change of work and daily routine has caused more time to spend at home and boredom, this leads to an increase in energy intake [4]. In addition, the loss of a dearest person, the fear of the disease, and death due to COVID-19 could increase the stress level. Stress leads subjects to increase energy intake, particularly 'comfort foods' rich in sugar, referred as "food craving" [5,6]. Simple carbohydrates contain of these foods are high. The consumption of these foods increases the production of serotonin and have a positive effect on mood [7]. However,

Abbreviations: BMI, Body mass index; EES, Emotional Eating Scale; WHO, World Health Organization.

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glycemic index levels are higher than other foods, therefore they are associated with the increased risk of cardiovascular diseases, obesity, and chronic inflammation. In particular, studies have shown that a chronic state of inflammation worsens COVID-19 complications [8,9]. Furthermore, emotional and psychological responses to the COVID-19 could lead to dysfunctional eating behaviors [10,11]. Previous studies reported that negative emotions increase the risk of emotional eating behavior [12,13]. Emotional eating is defined as overeating after stress and negative emotions [14]. People tend to eat as a mechanism to cope with mood changes [15]. During this period, the consumption of foods with a short shelf life such as fresh vegetables, fruits, meat, chicken, and fish are decreased; instead, the consumption of highly processed food with long life rich in high in fat, sugar and salt are increased [16,17].

Lifestyle and eating habit changes may lead to a considerable problem for public health. Maintaining a healthy diet is crucial, especially during the COVID-19 pandemic, to support and improve the immune system. Previously, emotional eating behavior has not been searched in a large Turkish individuals during the COVID-19 pandemic. Therefore, the aim of the study was to evaluate the emotional eating behavior during the COVID-19 pandemic in Turkey.

2. Material and methods

2.1. Study design and individuals

This cross-sectional study was planned to evaluate eating habits and lifestyle changes in Turkey during the COVID-19 pandemic. The study was carried out online and the data was obtained with a web-survey. The survey, accessible through any device with an internet connection, was conducted from August to September 2020 among the Turkish individuals aged between 18 and 65 years. Individuals under the age of 18 and pregnant women were excluded. The survey was distributed through email and social networks (Twitter, Instagram, Whatsapp, and Facebook). Participants completed the questionnaire by connecting directly to the Google platform. To determinate the sample size of the research a table called “predicts the rate in a society with a certain accuracy” was used [18]. The ratio (48.6%) reported by Di Renzo et al. was used as an indication (weight gain rate) of the prevalence of the population [19]. The sample size was determined as minimum 1067 people, taking into account the 95% confidence interval and 3% relative precision.

Before the research, the required permission was obtained from the “T.C. Ministry of Health COVID-19 Scientific Research Assessment Commission”. After that, the ethical approval was obtained from Necmettin Erbakan University Health Sciences Scientific Research Ethics Board (decision number 2020/1, 26 August 2020). The study was conducted in accordance with the principle of the Declaration of Helsinki. Online informed consent form was obtained from all participants.

2.2. Sociodemographic, anthropometric characteristics and eating habits

The questionnaire included sociodemographic characteristics, body weight, and height. Moreover, the questionnaire included hours of sleep, physical activity, appetite, changes in body weight, and work life before and after the COVID-19 pandemic.

The changes in eating habits were analyzed; foods related to stress in previous studies (fresh fruit, fresh vegetables, pastry, pasta-rice, bread, dessert, eggs, red meat, poultry, fish, milk, biscuits, chocolate, ice cream, chips) were selected and it was asked if there had been an increase or a reduction in their consumption.

2.3. Emotional Eating Scale

This scale was used to determine emotional eating during the COVID-19 pandemic in Turkey individuals. Emotional Eating Scale (EES) was developed by Garaulet et al. They applied this original scale to obese individuals to evaluate emotional eating behaviors [20]. The emotional eating scale consists of 10 sections and three subscales (disinhibition, type of food, and guilt). The questions are given on a likert type scale with four options (“0” Never, “1” Sometimes, “2” Usually, and “3” Always). There is no reverse item in the scale. In the scale, the lowest total score is “0” and the highest total score is “30”. High scores on the scale showed a high level of emotional eating behavior. According to Garaulet et al. scale, a score between 0 and 5 is equal to “non-emotional eater”, a score between 6 and 10 is equal to “low emotional eater”, a score between 11 and 20 is equivalent to “emotional eater” and a score between 21 and 30 is equal to “very emotional eater”. The validity and reliability of the scale in Turkish was conducted by Arslantaş et al. [21]. Similar to the original scale, the Turkish version also shows three subscales: disinhibition, type of food, and guilt. For the use of the Emotional Eating Scale was obtained the permission from Dr. Arslantaş.

2.4. Statistical analyses

Quantitative data were presented as average, standard deviation, minimum, and maximum values; the number and percentage tables of qualitative data were presented. Mann–Whitney U and Kruskal–Wallis tests were used to compare continuous variables between two or more groups. Binary and multinomial logistic regression analyses were conducted to analyze the association between categorical variables (dependent) and continuous or categorical ones (independent) [22]. These tests were used to compare the WHO groups to the body mass index (BMI) groups and to compare BMI groups and eating habits. Statistical analysis was performed using SPSS (Statistical Package for Social Sciences) for Windows ver. 21.0 (IBM, Chicago, IL, USA). The p value < 0.05 was considered to be statistically significant.

3. Results

3.1. Demographic and anthropometric characteristics

A total of 1626 adults, 69.6% women and 30.4% men, were included in the study. Participants' demographic and anthropometric characteristics are reported in Table 1. The majority of the participants group aged between 18 and 30 years (48.3%). The average BMI of all participants was 24.4 ± 4.7 kg/m² and 53.3% were normal weight, 6% were underweight, 29.2% were overweight and 11.6% were obese. In terms of disease, 7.6% of participants had a chronic disease diagnosed by the physician and 8.2% of participants had COVID-19 diagnosis.

According to educational status and location, most of the participants lived in a city (69.2%) and almost half (45.9%) had a university degree (Table 1).

3.2. Emotional eating behaviors

According to Emotional Eating scale, 36.9% of the participants were low emotional eaters, 34.8% were emotional eaters, 24.3% were non-emotional eaters and only 4% of participants were very emotional eaters. The obese ones were 43.5% emotional eaters and 30.6% low emotional eaters. 33.5% of the normal body weight and 18.4% of underweight people were emotional eaters. The Kruskal–Wallis test showed a statistically significant association between Emotional Eating score and BMI values ($p < 0.001$) (Table 2).

Table 1
Participants' demographic and anthropometric characteristics.

	n	%
Gender		
Female	1131	69.6
Male	495	30.4
Age (years)	Mean ± SD	Min-Max
	30 ± 11	18–64
Age groups (years)		
18–25	786	48.3
26–35	444	27.3
36–45	177	10.9
>45	219	13.5
Marital status		
Married	714	43.9
Single	912	56.1
Educational status		
Illiterate	6	0.4
Literate	28	1.7
Primary school graduate	110	6.8
Secondary school graduate	52	3.2
High school graduate	524	32.2
University graduate	747	45.9
Postgraduate	159	9.8
Weight (kg)	Mean ± SD	Min-Max
	68.0 ± 15.0	37–140
BMI (kg/m ²)	Mean ± SD	Min-Max
	24.4 ± 4.7	15–50
Class of BMI		
Underweight	98	6.0
Normal weight	866	53.3
Overweight	473	29.1
Obesity	189	11.6
Live location		
City	1126	69.2
County	402	24.7
Village	98	6.0
Disease diagnosed by the physician		
Yes	123	7.6
No	1503	92.4
COVID-19 diagnosis status		
Yes	132	8.2
No	1472	91.8

BMI: Body mass index.

Table 2
Association between Emotional Eating score and BMI.

Emotional Eating Behavior ^a	Class of BMI								Total	
	Underweight		Normal weight		Overweight		Obesity		n	%
	n	%	n	%	n	%	n	%		
Non-emotional eater	38	38.8	223	25.8	107	22.7	26	14.0	394	24.3
Low emotional eater	42	42.9	325	37.6	173	36.7	57	30.6	597	36.9
Emotional eater	18	18.4	290	33.5	175	37.2	81	43.5	564	34.8
Very emotional eater	0	0.0	27	3.1	16	3.4	22	11.8	65	4.0

^a KW; p < 0,001 BMI: Body mass index.

Table 3
Association between EES score and BMI, and between EES score and Gender.

	BMI Class				Total
	Underweight	Normal weight	Overweight	Obesity	
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Total score	6.98 ± 3.75	9.27 ± 5.28	9.77 ± 5.48	11.89 ± 6.16	9.58 ± 5.46
Gender ^a	Female		Male		
	10.23 ± 5.48		8.10 ± 5.12		

^a MWU, p < 0,001. BMI: Body mass index, EES: Emotional eating score.

The EES total score of the participants was 9.58 ± 5.46. Notably, the association between EES score and BMI values showed that obese subjects had the highest score.

Furthermore, females had a higher EES score than males and the difference was statistically significant (p < 0.001) (Table 3).

3.3. Eating habits

With regard to eating habits, a total of 49.9% participants did not change eating habits during the COVID-19 pandemic. During COVID-19 emergency, 28.0% of adults reported a more balanced and healthy diet, on the other hand, 22.1% of adults reported a more unbalanced and unhealthy diet. There was a statistically significant difference in the change of eating habits according to BMI values (KW; p < 0.005). Underweight and normal weight participants followed a healthier diet (30.6% and 30.9%; respectively); overweight and obese ones followed an unhealthier diet (Table 2). Moreover, 78.7% of subjects reported an increased food intake and 49.6% of subjects reported a decreased food intake during the COVID-19 pandemic. There was no statistically significant difference between the change in eating habits and food intake according to BMI values (p = 0.097; p = 0.053, respectively) (Table 4).

During this pandemic, 58.6% of the individuals started to work at home or distance learning at home. Before the COVID-19 pandemic, the majority of individuals (62.2%) slept 7–9 h, whereas with the COVID-19 33.1% of participants increased sleep hours and 9.7% decreased sleep hours. Furthermore, 39.5% of the participants had regular physical activity before COVID-19, whereas 26.1% of participants maintained their physical activity. During the COVID-19 pandemic, a total of 55.1% of the participants had no change in appetite, 32.7% of the participants had an increase in appetite, and 12.2% had less appetite. Concerning the body weight, 34.4% of the individuals had a weight gain in this period and 20% had a lose weight. The mean of body weight gain and lose was 4.4 ± 2.9 and 4.4 ± 3.7 kg, respectively (Table 5). There was a weak inverse correlation between emotional eating score with weight gain (p < 0.01, r = 0.165).

Table 4
Change in eating habits and food intake according to BMI.

	Total		Underweight		Normal weight		Overweight		Obesity	
	n	%	n	%	n	%	n	%	n	%
Eating habits changes ^a										
No	810	49.9	45	45.9	410	47.5	266	56.2	89	47.1
More unbalanced and unhealthy diet	359	22.1	23	23.5	187	21.6	100	21.1	49	25.9
More balanced and healthy diet	455	28.0	30	30.6	267	30.9	107	22.6	51	27.0
Increased food intake ^b										
Yes	1280	78.7	75	76.5	702	81.1	357	75.5	146	77.2
No	346	21.3	23	23.5	164	18.9	116	24.5	43	22.8
Reduced food intake ^c										
Yes	806	49.6	49	50.0	445	51.4	210	44.4	102	54.0
No	820	50.4	49	50.0	421	48.6	263	55.6	87	46.0

^a KW; p = 0,005.

^b KW; p = 0,097.

^c KW; p = 0,053. BMI: Body mass index.

Table 5
Assessment of lifestyle and body weight changes during the COVID-19 pandemic.

	n	%
Changed work/school habits ^a		
I work at home distance learning at home	816	58.6
Some days of the week I work at home and some days I go to the work.	166	12.0
I go to the work as usual	381	27.4
I got fired/I quit the job	28	2.0
Sleep habits pre-COVID-19		
<7 h/night	553	34.0
7–9 h/night	1010	62.2
>9 h/night	62	3.8
Changed sleep habits during COVID-19		
No difference	929	57.2
Increased sleep hours	538	33.1
Decreased sleep hours	158	9.7
Sport habits pre-COVID-19		
Yes	643	39.5
No	983	60.5
Sport habits during COVID-19		
Yes	424	26.1
No	1202	73.9
Changed appetite during COVID-19		
No difference	896	55.1
More appetite	532	32.7
Less appetite	198	12.2
Body weight changes		
No difference	739	45.6
Body weight gain	560	34.4
Body weight loss	325	20.0
Body weight gain (kg)	Mean ± SD	Min-Max
	4.4 ± 2.9	0–25
Body weight loss (kg)	Mean ± SD	Min-Max
	4.4 ± 3.7	0–23

^a Housewives are not included.

Considering the food consumption, the highest increase was reported in the consumption of fresh fruits and vegetables (44.2% and 31.4%; respectively); the highest decrease was observed in the consumption of chips, biscuits, and bread (12.7%, 11.3% and 11.3%; respectively) (Figs. 1 and 2).

Moreover, increased food intake according to BMI values showed that the obese participants increased the consumption of fresh vegetables and fruits, pastries, and eggs. On the other hand, underweight ones increased their consumption of fresh vegetables and fruits, milk, and eggs (Fig. 3).

4. Discussion

The study was conducted to evaluate emotional eating behavior with a large participation of Turkish individuals during the COVID-19 pandemic. The results of the study do not reflect the Turkish population, as online data were collected due to COVID-19. The results of the study should be supported by studies representing Turkish population.

Emotional eating disorders has spread during this period, because it regulates and reduces negative emotions such as depression, anxiety, and stress caused by the pandemic [23]. The majority of the individuals (75.7%) were emotional eating of different levels, only 24.3% were non-emotional eaters. The restrictions of individual freedom, loss of jobs, loss of a dearest person, alteration of habitual behaviors, fear of the disease due to COVID-19 increase the stress level and this influences emotional eating behavior [24]. Furthermore, prolonged containment measures make difficult to maintain a healthy lifestyle, because changes in physical activity, sleep habits, psychology, and eating habits [25,26]. Lifestyle changes, such as sleep habits or physical activity, can trigger emotional eating disorders [27,28]. Several studies have confirmed that stress or anxiety can affect emotional eating disorders [29,30]. Tan and Chow [30] determined that high levels of stress alters the control of eating behaviors and this is directly related to emotional eating. In addition, Hearon et al. [31] reported that anxiety and emotional eating are related, and people eat to cope with anxiety. In another study, high body mass index and low weight control are related to more frequent emotional eating behaviors [32]. Supporting the results of this study, Adrienne et al. [33] determined that the obese have more emotional eating behaviors. Lazarevich et al. [34] found a correlation without gender difference between BMI in 1453 university students and emotional eating. Similarly, this study reported that obese individuals have higher emotional eating scores (11.89 ± 6.16) (Table 3).

According to this study, the emotional eating score of women was higher than men (10.23 ± 5.48 and 8.10 ± 5.12, respectively). However, in a study conducted on college students, stress affected eating behavior in both male and female individuals, but men eat less in the event of stress than women [29]. Other studies supported that women show more emotional eating behaviors than men [35,36].

In this study, 78.7% of the individuals reported an increase in food intake. Studies show that staying home for an extended period increased food intake because of an easier and free access to food. These results support this study.

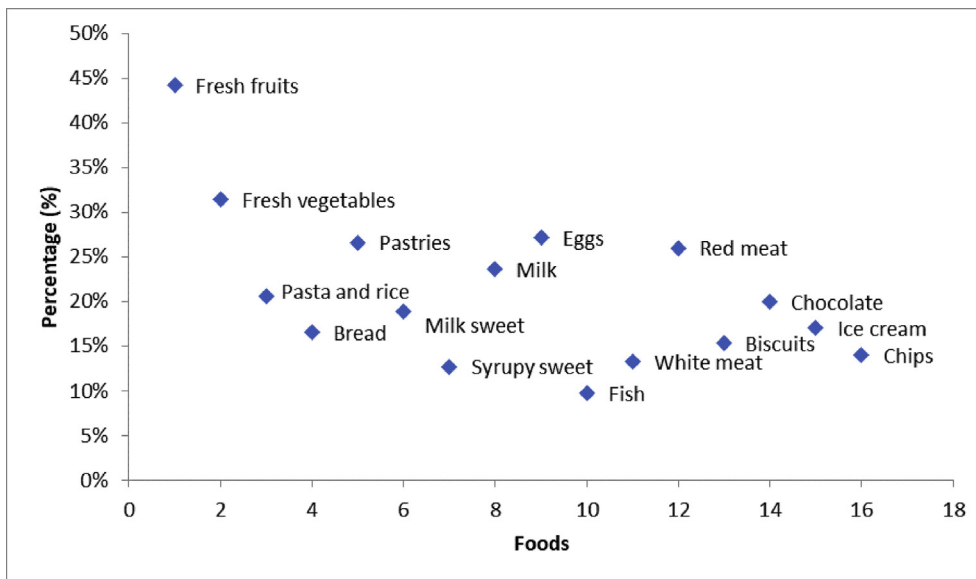


Fig. 1. Increased consumption of food and food groups during the COVID-19 emergency.

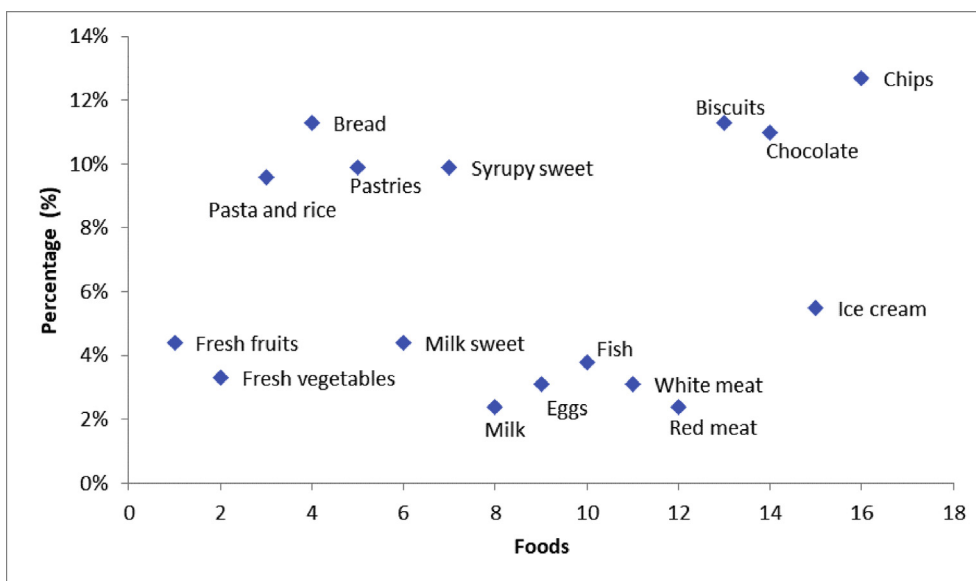


Fig. 2. Decreased consumption of food and food groups during the COVID-19 emergency.

However, the change in the metabolic cycle pattern, alterations of time-limited diet, increases the risk of dysmetabolism and obesity [37]. Although during quarantine obese and overweight tend to increase food intake [38], this study reported a higher increase of food intake in participants with normal BMI (81.1%). On the contrary, a total of 77.2% of obese increase their food intake. In addition, the obese individuals had the highest decrease in food intake (54.0%).

This can be associated with obese individuals' hesitation or lack of awareness of the actual food intake. Moreover, studies reported that 70% of obese indicate levels of food intake that do not make a physiological sense [39].

The COVID-19 pandemic has led to behavioral, psychosocial, and environmental changes in almost all societies and has brought a rapid weight gain. Khan and Smith [40] call this situation "covi-obesity". According to results of the study, 34.4% of participants

gained weight (4.4 ± 2.9 kg) during the pandemic. Similarly, during this period in Poland a total 30% of the population ($n = 1097$) gained weight (3.0 ± 1.6 kg), and in Chile 38.1% of women and 25.6% of men ($n = 750$) gained weight [10,11]. In Italy, 48.6% of participants ($n = 3533$) gained weight [19]. During the COVID-19 pandemic, weight gain is due to decrease in the frequency and duration of physical activity [11,41]. However, Italian population had no significant change in physical activity habits during the lockdown, but 34.4% of the population reported an increased appetite [19]. In this study, 32.7% of participants reported an increase in their appetite. Before the COVID-19 emergency, 39.5% of subjects regularly did physical activity, but during this period it decreased to 26.1%. In particular, these two factors may have caused a weight gain.

Obese and overweight reported an unhealthier and unbalanced diet during this period, similar to subjects that expressed a

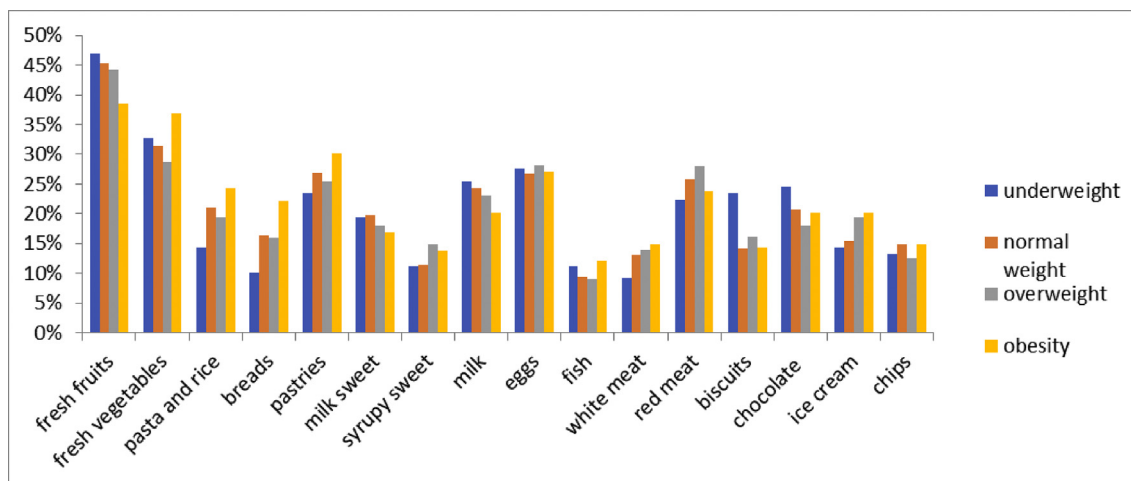


Fig. 3. Increased consumption of food and food groups (%) according to BMI.

healthier and balanced diet (25.9% and 27.0% obese, 21.1% and 22.6% overweight, respectively). Underweight and normal weight had a bigger difference between who had an unhealthier and a healthier diet (23.5% and 30.6% underweight, 21.6% and 30.9% normal weight, respectively). Psychological conditions of obese and overweight may have had a greater influence on tending to eat. These results are supported by numerous studies [10,42–44].

Participants reported an increase in consumption of fresh fruit and vegetables, protein sources such as eggs, milk, and red meat; while they reported a decrease in consumption of junk food such as biscuits, chips, chocolates, and carbohydrates such as pastries, syrupy desserts and bread. During the COVID-19 pandemic, other studies, as opposed to this study, found that people consumed more unhealthy food and less fresh fruit vegetables. Sidor et al. [10] observed that the more adults increase their BMI, they eat the less fruit, vegetables, and the more meat, dairy products, and fast food. However, the study in Poland was conducted for a period of 6 weeks of lockdown. Nevertheless, the longest quarantine in Turkey has lasted four days (with the weekend included). This allowed more accessible fresh fruits and vegetables to all, and reduced the consumption of fast food.

In addition, during the quarantine period, markets were not closed and individuals were allowed to shop at places within walking distance. Moreover, people find more time to cook at home because of working at home, and this reduces the consumption of ready-to-eat food.

The first case in Turkey was later compared to other countries and this increased awareness on healthy nutrition. Even before COVID-19, in Turkey reported a higher consumption of fresh vegetables and fruits compared to other countries [45]. This is associated with the abundance and easily accessible of fresh vegetables and fruit in Turkey. In particular, vegetables and fruits are rich in anti-oxidant and anti-inflammatory compounds such as vitamin C, B vitamins, and polyphenols. Many studies reported these compounds improve health [46–48].

Therefore, the consumption of high-quality nutrients is important against viral infections. This study showed that underweights have the highest consumption of fresh vegetables and fruit, eggs and milk (Fig. 3). In Italy, a study found that during lockdown, the population preferred Mediterranean diet and healthy nutrients, especially people with a low BMI [49]. These results, as this study, observed that people are looking for healthier foods.

The study showed that, surprisingly, participants reduced the consumption of carbohydrate-rich foods. Stress and quarantine, in

contrast to this study, show an increase in the consumption of carbohydrate-rich foods [10,44,50].

However, in a similar study, reported that adults reduced carbohydrate-rich foods during quarantine [51].

5. Conclusion

The COVID-19 pandemic, lifestyle changes and psychological conditions affected eating habits. During this emergency it was assessed the changes of weight and eating habits, due to factors such as working at home, digital education at home, change in physical activity habits, and alteration of sleep hours of Turkish individuals. Furthermore, in the study there were differences in food intake and emotional eating between obese and normal weight individuals. Participants reported an increased food intake and the majority are emotional eater at different levels; the obese ones have a higher emotional eating score. Sudden lifestyle changes and the increase in stress levels may affect emotional eating behavior. The study surprisingly reported that participants reduced the consumption of carbohydrate-rich foods, and especially underweight preferred nutrients of high quality.

In conclusion, the study showed the emotional eating behaviors, changes in weight, appetite, and eating habits of Turkish individuals during the COVID-19. However, as the pandemic is still ongoing, the data is an example for further research.

The study has some limitations. The data was collected through an online questionnaire. The conventional face to face interviews could not be applied because of pandemic precautions (travel restriction etc.) therefore online survey was chosen. Body weight and height information were obtained according to the statements of the participants.

Statement of authorship

All authors planned and discussed the results of this study. All authors have approved the final article.

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Declaration of competing interest

The authors have declared that no competing interests exist.

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