Revista Española de Nutrición Humana y Dietética
Spanish Journal of Human Nutrition and Dietetics

RESEARCH ARTICLE

Adverse Effect of Emotional Eating Developed During the COVID-19 Pandemic on Healthy Nutrition, a Vicious Circle: A cross-sectional descriptive study

Efecto adverso de la alimentación emocional desarrollado durante la pandemia COVID-19 sobre la nutrición saludable, un círculo vicioso: Un estudio descriptivo transversal

Burcu Ateş Özcan[a,*], Burcu Yeşİlkaya[a].

[a] Beslenme ve Diyetetik Bölümü, Sağlık Bilimleri Fakültesi, İstanbul Okan Üniversitesi, Tuzla, Turkey.
* burcuates474@hotmail.com

ABSTRACT

Introduction: Because of the new type of coronavirus disease (COVID-19) seen worldwide, many countries have a difficult time both in terms of health and economy. It is thought that infection and fear of death owing to the disease may cause a disturbance in the individuals' psychology. Moreover, precautions such as social distancing and quarantine to prevent the spread of the disease and the prolongation of these interventions may further aggravate the conditions, such as mood disorders and stress. This study was aimed to determine the emotional eating status of individuals during the COVID-19 pandemic and to determine its effect on a healthy eating attitude.

Material and methods: This is a cross-sectional descriptive study with a total number of 578 adults without COVID-19 diagnosis and treatment (422 [73%] women, 156 [27%] men). The study was conducted using the Google Forms web survey platform. The link to the survey was shared via WhatsApp and Instagram. The participants were asked to share the study link to reach out to as many potential participants as possible throughout the nation using the method known as snowball sampling. A questionnaire form which includes sociodemographic characteristics, the Turkish version of the Emotional Eater Questionnaire (EEQ-TR), and the Attitude Scale for Healthy Nutrition (ASHN) were applied to the participants. EEQ-TR and ASHN forms were answered twice, retrospectively for the pre-COVID period and prospectively during the COVID period.

Results: While average emotional eating scores increased compared to pre-COVID-19 scores, individuals shifted from low-level emotional eaters to emotional eaters ($p < 0.000$). On the other hand, the average ASHN scores decreased, and individuals shifted from the middle-level healthy eating attitude to a low level ($p < 0.000$). As the quarantine period increased, emotional eating, body weight, and body mass index (BMI) increased, and healthy eating attitude decreased ($p < 0.05$).

Conclusions: Individuals' emotional eating increased due to social distancing, self-quarantine, or isolation in the COVID-19 pandemic. These changes are found to be effective in healthy eating in a negative way. Long-term unhealthy eating is not recommended for people's health. Therefore, it is necessary to inform individuals about stress management, healthy nutrition, the importance of regular exercise, and sleep patterns.

Keywords: Diet, Food, and Nutrition; Feeding Behavior; Life Style; Diet, Healthy; Coronavirus Infections; *COVID-19*; *Severe acute respiratory syndrome coronavirus 2*; *SARS-CoV-2*.

RESUMEN

Introducción: Debido al nuevo tipo de enfermedad por coronavirus (COVID-19) que se observa en todo el mundo, muchos países tienen dificultades tanto en términos de salud como de economía. Se cree que la infección y el miedo a la muerte a causa de la enfermedad pueden alterar la psicología de las personas. Además, las precauciones como el distanciamiento social y la cuarentena para prevenir la propagación de la enfermedad y la prolongación de estas intervenciones pueden agravar aún más las condiciones, como los trastornos del estado de ánimo y el estrés. Este estudio tuvo como objetivo determinar el estado de alimentación emocional de las personas durante la pandemia de COVID-19 y determinar su efecto sobre una actitud de alimentación saludable.

Material y métodos: Se trata de un estudio descriptivo transversal con un total de 578 adultos sin diagnóstico y tratamiento de COVID-19 (422 [73%] mujeres, 156 [27%] hombres). El estudio se realizó utilizando la plataforma de encuestas web Google Forms. El enlace a la encuesta se compartió a través de WhatsApp e Instagram. Se pidió a los participantes que compartieran el enlace del estudio para llegar a la mayor cantidad posible de participantes en todo el país utilizando el método conocido como muestreo de bola de nieve. Se aplicó a los participantes un formulario de cuestionario que incluye características sociodemográficas, la versión turca del *Emotional Eater Questionnaire* (EEQ-TR) y la *Attitude Scale for Healthy Nutrition* (ASHN). Los formularios EEQ-TR y ASHN se respondieron dos veces, retrospectivamente para el período anterior al COVID y prospectivamente durante el período COVID.

Resultados: Si bien las puntuaciones promedio de alimentación emocional aumentaron en comparación con las puntuaciones anteriores a COVID-19, los individuos pasaron de comedores emocionales de bajo nivel a comedores emocionales (p <0,000). Por otro lado, los puntajes promedio de ASHN disminuyeron y los individuos cambiaron de una actitud de alimentación saludable de nivel medio a un nivel bajo (p <0,000). A medida que aumentó el período de cuarentena, la alimentación emocional, el peso corporal y el índice de masa corporal (IMC) aumentaron y la actitud de alimentación saludable disminuyó (p <0,05).

Conclusiones: La alimentación emocional de las personas aumentó debido al distanciamiento social, la auto cuarentena o el aislamiento en la pandemia de COVID-19. Se ha descubierto que estos cambios son efectivos para una alimentación saludable de manera negativa. No se recomienda una alimentación no saludable a largo plazo para la salud de las personas. Por lo tanto, es necesario informar a las personas sobre el manejo del estrés, la nutrición saludable, la importancia del ejercicio regular y los patrones de sueño.

Palabras clave: Nutrición, Alimentación y Dieta; Conducta Alimentaria; Estilo de Vida; Dieta Saludable; Infecciones por Coronavirus; *COVID-19; Síndrome respiratorio agudo severo coronavirus 2; SARS-CoV-2.*

KEY MESSAGES

- We determined participants' emotional eating status and healthy eating levels during COVID-19.

- As emotional eating increases, healthy nutrition decreases in the COVID-19 pandemic.

- As the quarantine period increases, emotional eating, body weight, and body mass index increase, and healthy nutrition levels decreases.

INTRODUCTION

Pandemics have been seen to influence countries throughout the history of humanity that led to the formation and change of cultures. For this reason, pandemics that have not only become health problems have also turned into a social problem that affects people and countries in social, cultural, economic, and political terms[1].

The COVID-19 virus emerged in Wuhan, China in December 2019 and then spread rapidly in the country and the world[2]. The World Health Organization (WHO) declared the outbreak as "Public Health Emergency of International Concern"[3] in January 2020. Many European countries, including Turkey and other countries in the world are infected with the virus. Countries are trying to control the virus with some measures such as social distancing, self-quarantine, or isolation. In this process, while people try to cope with the virus and fear of death, they can also feel themselves under pressure and experience emotional changes within the framework of long quarantine and social distance rules[3,4].

WHO defines health not only as the absence of illness and disability but as a complete physical, mental, and social well-being[5]. Healthy nutrition, including adequate and balanced nutrition, can help prevent many chronic and non-chronic diseases[6]. It was observed that 14% of the total annual deaths were preventable or delayed as reported in a study investigating the preventive or delaying effect of nutrition on cardiovascular diseases and nutrition-related cancer deaths. The recommendations of consumption of fruits and vegetables reduced or delayed deaths by 47% and adequate pulp intake by 32%[7]. Studies have shown that healthy eating approaches reduce mortality and increase life expectancy[8–10]. Thus, it is important and necessary to raise awareness about healthy nutrition. Accordingly, determining the nutritional status and healthy nutrition levels is a priority[11].

Meeting nutritional needs is a biological requirement for individuals. Nutrition has an important place in psychological terms and can be affected by the emotional changes of individuals. Individuals' food intake can increase when they feel under pressure or angry. Similarly, in situations of excitement or excessive stress, people may not consume any food[12,13].

Emotional eating may be characterized by the tendency to overeating, which occurs with the development of negative emotions[14]. Individuals use food to express their emotions, as reported by a study that investigated both internal and external processes underlying emotional eating behaviors. In the same study it was reported that emotional eaters increase their food consumption in order to obtain short-term satisfaction from negative emotions compared to non-emotional ones[15].

The effect of emotions on appetite and food intake may show an increase or decrease between 30% and 48%. Despite all these effects observed on eating behavior, it is not possible to determine for sure how emotions affect nutrition[16]. Therefore, more studies are needed. Various scales have been developed to determine emotional eating behaviors[17–20]. They may be guiding and beneficial to determine the recent situations related to emotional eating.

This research was planned to determine how the restrictions and measures experienced during the COVID-19 epidemic affected the emotional eating status and healthy diet levels of adult individuals.

MATERIAL AND METHODS

Participants and procedure

This cross-sectional and descriptive study was conducted with 578 adult individuals from three selected districts of Istanbul. Written consent was obtained from the study participants as per the Helsinki Declaration for their volunteering. No participant was diagnosed with COVID-19. Ethics Committee Approval was obtained from the Istanbul Okan University Health Sciences Research Ethics Committee with decision number 16 dated 11/06/2020. The study was conducted using the Google Forms web survey platform. The link to the survey was shared via WhatsApp and Instagram. The participants were asked to share the study link to as many potential participants as possible throughout the nation using snowball sampling[21].

Measurement tools

Individuals read and answered a questionnaire with demographic and general characteristics, "Turkish version of Emotional Eater Questionnaire (EEQ-TR)" to determine eating behavior and the "Attitude Scale for Healthy Nutrition (ASHN)" to determine the level of healthy nutrition. All questionnaires self-reported by the participants. Individuals answered the EEQ-TR and ASHN forms twice about their status before and after COVID-19. In the questionnaire individuals were asked about the maximum time they had been in quarantine since COVID-19 appeared in our country. This question was evaluated as "never going out," "except for minimum grocery shopping (basic needs)" and "COVID-19 curfews set in our country."

Measurement of height and body weights of the participants was questioned based on their own declaration due to the social distancing in the COVID-19 outbreak. Body mass index (BMI) of individuals was calculated by dividing the body weight by square meter of height [body weight (kg)/height (m^2)]. The results were evaluated according to the WHO classification[22].

Emotional Eater Questionnaire is one of the short, understandable, and easy measurement tools that can be used in the evaluation of eating and was developed in 2012 by Garaulet et al[23]. Cronbach's alpha coefficient of the scale is 0.70. The validity and reliability study of the Turkish adaptation of the scale was carried out by Arslantas et al[24]. In 2019, the alpha internal consistency coefficient was calculated as 0.84 for the entire scale. The scale, which has 10 items and three subparameters (not being able to prevent eating, food types, and feelings of guilt), consists of a four-point Likert-type scale (0: never, 1: sometimes, 2: generally, and 3: always). There are no inverse questions in the scale. The lowest score from the scale is 0, and the highest score is 30. High scores indicate high emotional eating behavior. The classification of the scale is as follows: Scores between 0 and 5 indicate the status of "not being emotional eater," scores

8

between 6 and 10 indicate the status of "low emotional eater," scores between 11 and 20 indicate "being emotional eater," and scores between 21 and 30 indicate being "very emotional eater"[24].

There was no study on the attitude toward healthy nutrition in the literature. Tekkursun Demir and her colleagues developed the "Attitude Scale for Healthy Nutrition" in 2019[25]. The scale consists of 21 questions and is a five-point Likert type. It consists of answers such as "I strongly disagree," "I do not agree," "I'm undecided," "I agree," and "Absolutely I agree." The 6th, 7th, 8th, 9th, 10th, 11th, 17th, 18th, 19th, 20th, and 21st questions are negative expressions. Likert answer scoring for positive questions is 1, 2, 3, 4, 5, respectively, while for negative questions it is 5, 4, 3, 2, 1. The lowest score that can be obtained from ASHN is 21, the highest score is 105. The classification of the scale is as follows: the scores of 21 and below are very low, the scores of 23–42 are low, the scores of 43–63 are medium, the scores of 64–84 are high, and the scores of 85–105 are ideally high that shows having a healthy diet attitude. The internal consistency coefficients of the scale were found to be 0.90 for the information factor, 0.84 for the emotional factor, 0.75 for the positive factor, and 0.83 for the poor nutrition factor[25].

Statistical analysis

The SPSS 22.0 (Statistical Package for the Social Sciences) was used for statistical analysis, and the confidence interval was accepted as 95% in statistical tests. Before the analyses, the data were coded to the software. Appropriate descriptive values were given for qualitative and quantitative variables. Qualitative variables were expressed as number (N) and percentage (%), and quantitative variables were expressed as mean and standard deviation (SD). The distribution was determined by Kolmogorov–Smirnov tests. The homogeneity of the variances of the groups was examined with the "Levene" test. The dependent t-test was used for the data with normal distribution, and Mann–Whitney U test was used for the data without normal distribution. In terms of categorical variables, Pearson's chi-squared test was used for data less than 5 and expected frequency less than 20% and Fisher's exact test statistics if greater than 25%. Spearman's correlation test was used to determine the relationship between quantitative variables. $p < 0.05$ was accepted as the statistical significance limit.

RESULTS

Of the participants in this study, 422 (73%) were women and 156 (27%) were men. The average age was found to be 31.74 years (95% CI: 30.74- 32.77) [for women: 29.83 years (95% CI: 28.81-30.86), for men: 36.90 years (95% CI: 34.59- 39.22). Out of them, 61.1% of the individuals were married and 60.7% were undergraduate. Individuals' social status mostly consisted of students, officer, and worker, and their income level was medium or good (Table 1).

The

Table 1: Socio-demographic characteristics of the individuals.

	N= 578	%
Sex		
Male	156	27
Female	422	73
Age group		
18 - 24	238	41.2
25 - 34	201	34.8
35 - 44	56	9.7
45 - 54	32	5.5
55 - 64	51	8.8
Marital Status		
Single	353	61.1
Married	225	38.9
Employment status		
Not working	61	10.6
Officer	127	22.0
Worker	116	20.1
Retired	37	6.4
Student	157	27.2
Self employment	80	13.8
Education		
Primary school graduate	7	1.2
Middle school graduate	16	2.8
High school graduate	87	15.1
Undergraduate	351	60.7
Postgraduate	115	19.9
Perceived income		
Not enough	94	16.3
Just enough	256	44.3
More than needed	228	39.4

average BMI of the participants was found to be 24.12 kg/m^2 (95% CI: 23.77- 24.48)[23.30 kg/m^2 (95% CI: 22.88- 23.71) for women and 26.36 kg/m^2 (95% CI: 25.79- 26.93) for men]. The average maximum quarantine duration during the COVID-19 was found to be 32.67 days (95% CI: 30.11- 35.23) [37.34 days (95% CI: 34.27- 40.40) for women, 20.03 days (95% CI: 15.99- 24.07) for men] (not shown in the table).

The EEQ-TR scores of the individuals increased, and ASHN scores decreased from the beginning of COVID-19 (p = 0.000). The increase in EEQ-TR scores was higher in women (p = 0.000). The

ASHN final scores of women were lower ($p = 0.003$) (Table 2). In terms of EEQ-TR scores, 88.2% of women and 96.2% of men had low emotional eating before COVID-19, while 61.4% of women and 67.3% of men had emotional eating and 35.3% of women and 24.4% of men had high emotional eating during COVID-19 (Table 3).

Table 2. Average EEQ-TR and ASHN scores of the individuals.

	Female (N: 422)		Male (N: 156)		Total (N: 578)		P_m
	MEAN (SD)	95% CI	MEAN (SD)	95% CI	MEAN (SD)	95% CI	
EEQ-TR							
Before COVID-19	7.81 (4.05)	7.42- 8.19	7.08 (2.91)	6.62- 7.54	7.61 (3.79)	7.30- 7.92	0.091
During COVID-19	20.17 (5.18)	19.68- 20.67	18.31 (5.12)	17.50- 19.12	19.67 (5.22)	19.24- 20.10	**<0.001**
p_{pair}	**<0.001**		**<0.001**		**<0.001**		
ASHN							
Before COVID-19	48.42 (12.54)	47.22- 49.62	52.74 (11.63)	50.90- 54.58	49.59 (12.44)	48.57- 50.60	**<0.001**
During COVID-19	36.54 (11.55)	35.43- 37.65	40.26 (12.91)	38.22- 42.30	37.55 (12.04)	36.56- 38.53	**0.003**
P_w	**<0.001**		**<0.001**		**<0.001**		

P_w: wilcoxon, p_m: Man-Whitney U, EEQ-TR: Turkish version of emotinal eater questionnaire, ASHN: Attitude scale for healthy nutrition, SD: Standard Deviation, CI: Confidence Interval

Table 3. Distribition of EEQ-TR of the individuals.

	Female (N: 422)		Male (N: 156)		Total (N: 578)		P
	N	%	N	%	N	%	
Before COVID-19							
Low emotional eater	372	88.2	150	96.2	522	90.3	
Emotional eater	41	9.7	4	2.6	45	7.8	**0.013**
Very emotional eater	9	2.1	2	1.2	11	1.9	
During COVID-19							
Low emotional eater	14	3.3	13	8.3	27	4.7	
Emotional eater	259	61.4	105	67.3	364	63.0	**0.004**
Very emotional eater	149	35.3	38	24.4	187	32.3	

P: chi-square, EEQ-TR: Turkish version of emotinal eater questionnaire

While 51.7% of women and 63.5% of men had moderate healthy nutrition attitudes before COVID-19, 57.3% of women and 48.7% of men had low healthy nutrition attitude during COVID-19 (Table 4). It was found that EEQ-TR scores had negative correlations with age (r = −0.179, *p* = 0.000) and ASHN scores during COVID-19 (r = −0.323, *p* = 0.000) and positive correlations with body weight (r = 0.173, *p* = 0.000), BMI (r = 0.250, *p* = 0.000), and quarantine duration (r = 0.610, *p* = 0.025). Thus, both body weight and BMI increase with increase of emotional eating. It was observed in our study that emotional eating increases with the increase of quarantine period (Table 5).

Table 4. Distribition of ASHN of the individuals.

	Female (N: 422)		Man (N: 156)		Total (N: 578)		P
	N	%	N	%	N	%	
Before COVID-19							
Very low	2	0.5	-	-	2	0.3	
Low	157	37.2	36	23.1	193	33.4	
Medium	218	51.7	99	63.5	317	54.8	**0.011**
High	45	10.7	21	13.5	66	11.4	
During COVID-19							
Very low	52	12.3	12	7.7	64	11.1	
Low	242	57.3	76	48.7	318	55.0	
Medium	126	29.9	64	41.0	190	32.9	**0.005**
High	2	0.5	4	2.6	6	1.0	

p: chi-square, ASHN: Attitude scale for healthy nutrition

Table 5. Relationships between individuals' EEQ-TR scores (during COVİD-19) with some parameters.

	r	P
Age (year)	-0.179	**<0.001**
Body weight (kg)	0.173	**<0.001**
BMI (kg/m^2)	0.250	**<0.001**
Quarantine duration	0.610	**0.025**
ASHN scores (During COVİD-19)	-0.323	**<0.001**

Spearman correlation, EEQ-TR: Turkish version of emotinal eater questionnaire, ASHN: Attitude scale for healthy nutrition

DISCUSSION

Pandemics have been seen to have a devastating effect on societies and civilizations[1]. COVID-19 pandemic that emerged in China in December and rapidly affected the entire world with its high mortality and morbidity rates and pushed people to change their lifestyles through social distancing, home isolation, and quarantine[26]. In this process, individuals may feel hopeless, unhappy, and helpless with the effect of disease and fear of death. As the exposure to this process increases, individuals may experience stress and become depressed with mood disorders indirectly[27]. The prevalence of mental illness and its relationship with social media exposure was investigated in a study conducted with 4872 participants, who were over the age of 18 years, during the COVID-19 outbreak in Wuhan. The prevalence of depression in the general population over the age of 18 was reported to be 48.3%, anxiety 22.6%, and the combination of depression and anxiety 19.4% during the COVID-19 epidemic[28]. According to the results of a systemic review and meta-analysis study investigating the prevalence of stress, anxiety, and depression in the general population during the COVID-19 pandemic, the prevalence of stress was found to be 29.6% in 5 studies with a total sample size of 9074, and anxiety prevalence was 31.9% in 17 studies with a sample size of 63,439, the prevalence of depression was found to be 33.7% in 14 studies with a sample size of 44,531[29].

Studies showed that stress and depression were associated with emotional eating[30,31]. A study by Tan et al.[31] found that the stress experience of individuals was associated with their ability to respond poorer to intrinsic signals of hunger and satiety, and this was found to be associated with higher emotional eating. In a study conducted with 900 participants from the Netherlands, England, Germany, and Spain, and by using MooDFOOD data, the relationship between the history of depression or the severity of depression and emotional eating was examined. Accordingly, the history and severity of depression were found to be associated with emotional and uncontrolled eating. Somatic depressive symptoms, "increased appetite" and "weight gain," were more strongly associated with unhealthy eating styles than other symptoms[30].

Increased emotional eating can affect individuals' health and make them susceptible to infections and diseases by pushing them to overeat and making unhealthy nutrition choices[32]. This causes individuals to confront COVİD-19 by putting them in a vicious circle. Our study observed that the emotional eating of individuals increased compared to pre-COVID-19, and deterioration was observed in their attitudes related to healthy nutrition. It was observed in a study by Dohle et al.[33] that the consumption of high-fat and sugary foods increased with the increasing level of emotional eating. Emotional eating was higher and average attitude scale for

healthy nutrition was lower in women during COVID-19. Studies also showed that emotional eating was more common in women[34–36]. This situation was thought to be due to the more intense emotional expressions of women[37]. Santos et al.[38] in their study found that emotional eating and uncontrollable eating were found to be statistically significantly higher in women compared to men. In addition, it was found in their study that weight increased in both groups with decreased emotional eating and lean muscle mass; significant associations were observed between uncontrolled eating and carbohydrate consumption in women ($r = 0.52$, $p < 0.05$).

Emotional eating can be defined as the tendency to overeat in response to negative emotions such as anxiety and irritability[39]. Emotional eaters tend to consume high-calorie, fatty, and sugary foods when exposed to negative emotions[40]. This situation may lead to the development of diabetes and heart diseases by causing an increase in body weight and BMI[41]. In our study, it is seen that emotional eating increases with the increase in quarantine period. Finally, both body weight and BMI increase as emotional eating increases. A positive relationship was found between overweight and obese individuals and emotional eating in a study by Ozier et al.[42].

An adequate and balanced nutrition is important for strengthening the immune system while an unhealthy diet can have the opposite effect. The suppression of the immune system increases the risk of infectious diseases and also causes longer recovery times[43]. In pandemics, it is very important to support the immune system[44]. In our study, it is seen that as the quarantine period increases, emotional eating increases, and as emotional eating increases, individuals' attitude toward healthy eating decreases. This suggests that individuals may increase their risk of getting infected with COVID-19 if their immune system is affected.

Since the COVID-19 pandemic was not predictable, the scales of the study could not be applied before it. Thus, retrospective data were obtained from individuals. Some researches showed the relationship between emotional eating and body weight changes and bad eating habits. However, there are no studies that shed light on general nutrition.

Limitations

Since the COVID-19 pandemic was not predictable, the scales of the study could not be applied before it. Thus, retrospective data were obtained from individuals. This situation is a limitation of the study and also gives an approximate idea about the general situation of the individuals. Considering that the COVID-19 pandemic will continue for a while, this issue can be supported by more studies that can compare the progression of the pandemic.

CONCLUSIONS

Pandemics are a global problem and require a multidisciplinary, systematic, and patient study to prevent and improve health. It is important to apply possible methods of struggle, especially for mood changes, stress, and depression caused by restrictions. In this way, unhealthy behaviors associated with mood can also be prevented. In addition, a sufficient and balanced diet, recommended exercise, and sleep patterns will support the immune system and create a protective effect. Thus, it is extremely important to raise awareness, educate, and support the people about the proposed lifestyle changes by using channels such as social media. As the effects of the COVID-19 pandemic continue, the prolongation of social isolation can trigger people to be more stressed. In this context, education of stress management, increased awareness of the society, regular exercises, positive thoughts, being kind to yourself, taking out time for yourself can be counted as effective practices in fighting stress.

AUTHORS CONTRIBUTION

Idea/ concept & design/ writing the article: BAÖ; control/ data collection/ processing & analysis/ literature review/ references: BAÖ, BY.

FUNDING

The authors have no financial relationships relevant to this article to disclose.

CONFLICT OF INTEREST

The authors state that there are no conflicts of interest in preparing the manuscript.

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Rev Esp Nutr Hum Diet. 2021; 25 (Supl. 2): e1144   **Freely available online - OPEN ACCESS**
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25