Nutritional Behavior During COVID-19 Pandemic: The Effect of Fear and Sleep Quality on Emotional Eating

Havvanur Yoldas Ilktac (✉ havvanur.yoldas@medeniyet.edu.tr)

Istanbul Medeniyet University: Istanbul Medeniyet Universitesi <https://orcid.org/0000-0002-7433-6370>

Cemile SAVCI

Istanbul Medeniyet University: Istanbul Medeniyet Universitesi

Ayşe CİL AKINCI

Istanbul Medeniyet University: Istanbul Medeniyet Universitesi

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Abstract

Purpose

Even though it is known that fear and poor sleep quality trigger emotional eating, whether fear of COVID-19 and poor sleep quality have effects on emotional eating during the COVID-19 pandemic is not clear. This study was performed to evaluate the effect of fear of COVID-19, sleep quality and sociodemographic characteristics such as age, gender, BMI on emotional eating during COVID-19 pandemic in Turkey.

Methods

The research data were collected via the 'Participant Information Form', the 'Fear of COVID-19 Scale', the 'Pittsburgh Sleep Quality Index', and the 'Emotional Eating Scale'.

Results

Fear of COVID-19 Scale score (β : 0.090, $p < 0.05$) and Pittsburgh Sleep Quality Index score (β : 0.289, $p < 0.001$) separately affected the Emotional Eating Scale score in the rate of 0.8% and 8.3%, respectively. Fear of COVID-19 Scale score (β : 0.042, $p > 0.05$), Pittsburgh Sleep Quality Index score (β : 0.246, $p < 0.001$), age (β : -0.259, $p < 0.001$), gender (β : -0.169, $p < 0.001$) and Body Mass Index (β : 0.275, $p < 0.001$) were affecting Emotional Eating scale score in rate of 18.3%. Fear of COVID-19 alone has a minimal effect on emotional eating, but when combined with variables such as sleep quality, BMI, age and gender, its effect on emotional eating disappears.

Conclusions

In the light of these results, it is recommended to screen all individuals in the society during the pandemic in terms of emotional eating, especially those who are young, female, have a high BMI, low sleep quality, and high fear of COVID-19 and nutrition education should be provided to these people.

Level of evidence

Level V, cross-sectional predictive study.

Introduction

The COVID-19 pandemic led to the deterioration of physical and mental health of the individuals by influencing daily life deeply across the world [1]. Compulsory quarantines and restrictions to protect public health implemented for a long time and the uncertainties about COVID-19 gave rise to psychological disorders, fall in physical activities, sleep problems, and changes in dietary habits and body weight. [2–10]. Psychological problems such as anxiety, depression, stress, fear and poor sleep quality and physical restrictions cause changes in individuals' eating habits or trigger emotional eating [11–13]. Emotional eating is described as the tendency to overeat as a coping mechanism to regulate

and reduce negative emotions such as depression, anxiety, and stress [14]. Emotional eating essentially rests on two assumptions. The first assumption is that the negative emotions motivate the individual to eat whilst the second assumption is that the act of eating lowers the intensity of negative emotions [15, 16]. It is reported that there was a negative relationship between emotional eating and sleep quality [17–19] and positive relationship between emotional eating and anxiety and depression [20]. It is also reported that there is no direct relationship between emotional eating and fear of COVID-19, and that depression mediates the relationship between fear of COVID-19 and emotional eating [21]. Emotional eating, changes in mood and sleep pattern, alone or in combination, may lead to short-term or long-term health problems such as obesity, diabetes, hypertension, and coronary artery disease [22–26].

If emotional eating and the factors that cause emotional eating are put under control, then the health problems likely to arise from emotional eating can be prevented. To this end, firstly, it is necessary to identify the factors inducing emotional eating and to take initiatives aiming to control these factors. Fear, sleep quality and emotional eating have been evaluated in different studies during the pandemic [13, 27–29]. However, so far, no study has evaluated the collective effect of fear of COVID-19, sleep quality, and sociodemographic characteristics such as age, gender, BMI on emotional eating.

This study aims to evaluate the Turkish population's fear of COVID-19, sleep quality, and emotional eating behavior, and determine whether fear of COVID-19, sleep quality, and sociodemographic characteristics such as age, gender, BMI have an effect on emotional eating behavior.

Research questions:

1. What is the individuals' fear of COVID-19, sleep quality, and emotional eating levels during the pandemic?
2. Does fear of COVID-19 have an effect on emotional eating during the pandemic?
3. Does sleep quality have an effect on emotional eating during the pandemic?
4. What is the collective effect of COVID-19 fear, sleep quality and sociodemographic characteristics such as age, gender, BMI on emotional eating?

Methods

Design

This is a descriptive, correlational, and predictive study.

Participants

The population of the study was comprised of individuals who resided in Turkey between November 2020- January 2021. The sample consisted of 495 individuals who met the inclusion criteria, selected with the convenience sampling method. Volunteers who were 18 years of age or older, who were able to speak, read and comprehend Turkish, who did not have any physical or cognitive health problems that would hinder filling the form were included within the scope of the research. All procedures performed in

studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Approval was obtained from the ethics committee of Istanbul Medeniyet University Social and Human Sciences Ethics Committee (27.

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) and Scientific Research Platform of the Ministry of Health of Turkey (2020-10-22T19_39_16). Written informed consent was obtained from all subjects.

Data Collection Forms

The research data were collected via the 'Participant Information Form' that was prepared by the researchers in light of the relevant literature [2, 9, 30, 31], the 'Fear of COVID-19 Scale', the 'Pittsburgh Sleep Quality Index', and the 'Emotional Eating Scale'.

Participant Information Form; In this form, there were ten questions evaluating the sociodemographic and descriptive characteristics of the participants such as age, gender, marital status, educational status and BMI.

Fear of COVID-19 Scale (FCV-19S); This form was developed by Ahorsu et al. (2020) to measure COVID-19-induced fear levels [32]. Designed as a five-point Likert-type scale, the FCV-19S has seven items, and the scores to be obtained from the FCV-19S range from 7 to 35 points. A high score indicates that the respondent has high-level COVID-19 fear. The Cronbach's alpha coefficient of the scale was reported to be 0.82. The Cronbach's alpha coefficient in the Turkish validity and reliability study conducted by Ladikli et al. (2020) was 0.80, and the Cronbach's alpha coefficient in the current study was 0.874 [33].

Pittsburgh Sleep Quality Index (PSQI); The PSQI is a scale that provides information about the sleep quality for the last month. In the PSQI that is comprised of a total of 24 questions, 19 questions are answered by the participant while 5 questions are answered by the participant's bed partner. While the questions answered by the participant are included in the evaluations, the questions answered by the participant's bed partner are not taken into consideration. Each question in the PSQI is scored from 0 to 3 points. The total scores to be obtained from the seven components of the PSQI range from 0 to 21 points. A total PSQI score of 5 points or below indicates that the participant has 'high sleep quality' whereas a total PSQI score above 5 points shows that the participant has 'low sleep quality' [30, 34]. The validity and reliability study for the PSQI was performed in Turkish by Ağargün et al. (1996), and the Cronbach's alpha coefficient was ascertained as 0.80 [35]. In this study, the Cronbach's alpha coefficient was found as 0.717.

Emotional Eating Scale (EES); The EES developed by Bilgen (2018) to identify the individuals' emotional eating levels has four sub-scales, that is, eating when nervous, eating to cope with negative emotions, self-control, and control against stimuli, and 30 items. It has a 5-point Likert-type scale with a minimum score of 30 and maximum score of 150. As the score obtained from the EES increases, the emotional eating level goes up. A respondent obtaining a score of 75 points or above is considered to have

emotional eating behavior. The Cronbach's alpha coefficient was calculated for the overall EES as 0.96 [36]. In this study, the Cronbach's alpha coefficient was calculated for the overall EES as 0.957.

Data Analysis

The data analysis was performed with SPSS 22.0 software. Of the descriptive statistics, the numbers, percentages, means, standard deviations, and minimum and maximum values were calculated. In the analysis of the relationship between the two quantitative variables with a normal distribution, the Pearson correlation coefficient was used. Multiple linear regression analysis was performed to determine the factors affecting emotional eating. Statistical significance was defined as a p value < 0.05.

Results

Of the 495 participants, whose mean age was 32.3 ± 12.8 , 69.1% were women, 53.1% were single, 38.8% were high school graduates, 67.1% had a moderate economic status. The mean of participants' FCV-19S scores, PSQI scores and EES scores were 17.8 ± 6.3 , 6.0 ± 2.3 and 67.2 ± 24.2 , respectively. Fifty-six percent of the participants had poor sleep quality, while 33.7% had emotional eating behavior (Table 1).

Table 1
Participants' characteristics (N = 495)

Variables	Mean $\pm$ SD	Min.-Max.
Age (years)	32.3 $\pm$ 12.8	(18–73)
BMI (kg/m ²)	23.7 $\pm$ 4.1	(16.1–38.1)
	N	%
Gender		
Male	153	30.9
Female	342	69.1
Marital status		
Married	232	46.9
Single	263	53.1
Education level		
Primary or secondary school	20	4.0
High school	192	38.8
Undergraduate school	178	36.0
Graduate school	105	21.2
Economic situation		
Low-level income	30	6.1
Medium-level income	332	67.1
High-level income	133	26.9
FCV-19S	17.8 $\pm$ 6.3	(7–35)
PSQI	6.0 $\pm$ 2.3	(2–14)
Poor sleep quality (N = 281, 56.8%)		
EES	67.2 $\pm$ 24.2	(31–140)
Eating when nervous	22.8 $\pm$ 10.5	(11–55)
Eating to cope with negative emotions	20.4 $\pm$ 9.7	(10–50)
Self-control	15.8 $\pm$ 4.3	(6–28)
Control against stimuli	8.3 $\pm$ 2.9	(3–15)

Variables	Mean $\pm$ SD	Min.-Max.
Participants having emotional eating behavior (N = 167, 33.7%)		

Significant negative correlations were found between the age and the overall EES score and 3 sub-scales ($p < 0.01$). BMI score had a significant positive correlation with the self-control sub-scale score of EES. FCV-19S score had significant positive correlations with the overall EES score and its eating when nervous and eating to cope with negative emotions sub-scales' score ($p < 0.05$). PSQI score had statistically significant positive correlations with the overall EES score and its sub-scales' scores ($p < 0.01$) (Table 2).

Table 2
Correlations between FCV-19S, PSQI, and EES scores (N = 495)

Variables	EES				
	Eating when nervous	Eating to cope with negative emotions	Self-control	Control against stimuli	Overall EES
Age (years)	$r = -.222^{**}$ $p = .169$	$r = -.174^{**}$ $p = .000$	$r = -.121^{**}$ $p = .007$	$r = -.263^{**}$ $p = .000$	$r = -.219^{**}$ $p = .000$
BMI (kg/m²)	$r = .062$ $p = .169$	$r = .075$ $p = .095$	$r = .177^{**}$ $p = .000$	$r = -.066$ $p = .141$	$r = .081$ $p = .073$
FCV-19S	$r = .090^{*}$ $p = .046$	$r = .105^{*}$ $p = .020$	$r = -.006$ $p = .901$	$r = .084$ $p = .061$	$r = .090^{*}$ $p = .046$
PSQI	$r = .298^{**}$ $p = .000$	$r = .266^{**}$ $p = .000$	$r = .176^{**}$ $p = .000$	$r = .185^{**}$ $p = .000$	$r = .289^{**}$ $p = .000$
Pearson Correlation, *: $p < 0.05$, **: $p < 0.01$					

To identify the factors that affect emotional eating during the COVID-19 pandemic, five different models were examined consecutively. In model 1, 0.8% of variance in EES was explained by FCV-19S (β : 0.090, $p < 0.05$), in model 2, 8.3% of variance in EES was explained by PSQI (β : 0.289, $p < 0.001$). In model 3, 8.7% of variance in EES was explained by FCV-19S (β : 0.060, $p > 0.05$) and PSQI (β : 0.283, $p < 0.001$). In model 4, 9.5% of variance in EES was explained by FCV-19S (β : 0.067, $p > 0.05$), PSQI (β : 0.284, $p < 0.001$) and BMI (β : 0.092, $p < 0.001$). In model 5, 18.3% of variance in EES was explained by FCV-19S (β : 0.042, $p > 0.05$), PSQI (β : 0.246, $p < 0.001$), age (β : -0.259, $p < 0.001$), gender (β : -0.169, $p < 0.001$) and BMI (β : 0.092, $p < 0.05$) (Table 3).

Table 3
Multiple linear regression analysis of the factors that affect emotional eating
(N = 495)

	Model 1 β	Model 2 β	Model 3 β	Model 4 β	Model 5 β
FCV-19S	0.090**		0.060***	.067***	0.042***
PSQI		0.289*	0.283*	.284*	0.246*
BMI				.092**	0.275*
Age (years)					-0.259*
Gender					-0.169*
R	0.090	0.289	0.295	0.309	0.428
R ²	0.008	0.083	0.087	0.095	0.183
ΔR^2	0.006	0.082	0.083	0.090	0.175
F	4.008	44.886	23.441	17.249	21.966
p	0.046	0.000	0.000	0.000	0.000
*p = 0.000, **p < 0.05, ***p > 0.05					
Codes are as follows: 0 = Female, 1 = Male					

Discussion

The COVID-19 pandemic affected the individuals' lifestyles significantly and, along with the COVID-19 pandemic, there was an increase in the emotional and mental health problems as well as a change in the individuals' sleep and dietary patterns particularly in connection with the quarantine measure [5–7, 21]. At the beginning of the COVID-19 pandemic, the ambiguities about how the disease spread and what the ways of protection from it were and, in the following period, lack of an effective vaccine to protect from the disease led to an increase in the feeling of fear in the individuals [28, 37, 38]. While the mean of participants' FCV-19S scores was 17.8 ± 6.3 points in this study, it was found as 14.3 ± 5.3 , 16.7 ± 5.3 , and 19.4 ± 6.0 in other studies [27, 39, 40]. In this respect, it can be asserted that the individuals did not feel high-level fear. This situation might be in place as the research findings were obtained during the second wave of the pandemic when the individuals got information about the ways of getting infected with COVID-19 and being protected from it and, above all, the vaccine development efforts looked promising.

The quarantine measures taken in the period of pandemic urged human beings to stay at home and allowed them to communicate with the external world solely through mass communication media such as the internet, TV, radio, and newspapers. In a study performed in Ecuador it was found that mandatory confinement during COVID-19 pandemic caused changes in the eating habits and sleep quality [41]. In

this current study, it was reported that the mean of participants' PSQI scores was 6.0 ± 2.3 points and 56.8% of the individuals had low sleep quality. Similar to the findings of our study, a previous study set forth that the mean of PSQI scores was 6.1 ± 3.0 points [9]. There are studies in literature reporting that there was a change in hours of sleep and sleep quality was affected during quarantine [8, 41]. Also, in a study conducted in the United Arab Emirates during the pandemic lockdown, it was reported that 60.8% of the participants had sleep disturbances [42]. As a result, it has been determined that the COVID-19 pandemic caused worsening of sleep quality in more than half of the population. Therefore, interventions to increase the sleep quality of individuals should be planned.

In this current study, the mean of participants' EES scores was 67.2 ± 24.2 points and one-third of the participants had emotional eating behavior. In a study it was reported that emotional eating was observed in 54% of the population during COVID-19 pandemic [43]. Also, in a study conducted on Saudi women, it was reported that 40.4% of the participants had "moderate" and 12.4% had "high" level of emotional eating [44]. Although these results differ between societies, they show that emotional eating is a common problem in the pandemic period and this problem should be addressed.

According to this study, the effect of fear of COVID-19 on emotional eating is minimal. When combined with other variables, this minimal effect disappears. Unlike our findings, one study reported that psychological distress was strongly associated with emotional eating [43]. In a study carried out in Turkey, although there was a relationship between fear and emotional eating, in further analyzes, no direct association between fear of COVID-19 and emotional eating was observed, but depression was associated with emotional eating and it mediated the relationship between fear of COVID-19 and emotional eating [21]. As a result, it can be said that fear of COVID-19 alone has a minimal effect on emotional eating, but when combined with other variables, its effect on emotional eating disappears. It was considered that the fear of COVID-19 was felt at the beginning of the pandemic and was replaced by depression in the second wave of the pandemic. In fact, the level of fear felt by the individuals was not very high in this study.

According to this study, sleep quality alone affected emotional eating in a rate of 8.3%. There are studies in literature before the pandemic showing that poor sleep quality was found to be associated with emotional eating [17–19] and unhealthy dietary behaviors [45], on the other hand, a study conducted on the women during the COVID-19 pandemic stated that sleep quality did not affect emotional eating [44].

Being less exposed to the sunlight due to staying at home behind closed doors during the pandemic can change the sleep pattern by leading to circadian rhythm abnormalities [46]. The changes occurring in the sleep pattern and sleep quality due to the change in the circadian rhythm can also trigger to emotional eating behavior. As a matter of fact, in a study, it is reported that the change in circadian rhythm exacerbated the risk and symptoms of emotional eating in individuals [9].

In this study, we found that having high fear of COVID-19, being at a poor sleep quality, having a high BMI, young age and being female affected emotional eating at the rate of 18.3%. There are other studies in literature reporting that emotional eating was more prevalent among the women [21, 43] and the

individuals with a higher BMI score [44]. It is also stated that in the COVID-19 pandemic, there are greater changes in the habitual food consumption of women compared to men [41]. As a result, it was determined with this study that during the pandemic period, high fear of COVID-19, poor sleep quality, high BMI, young age and being a woman can contribute to emotional eating.

Strength And Limits

Not using a scale that evaluated the depression level in this study is a significant shortcoming, and hence, it is recommended that depression scales be utilized in the prospective studies to be designed to affect emotional eating. In future studies, it is recommended to obtain a food consumption record as it will provide better information about the nutritional habits of individuals. Additionally, it is recommended to evaluate emotional eating in fragile groups such as the elderly, pregnant women, children, individuals with chronic diseases such as diabetes, cardiovascular disease, hypertension, and obesity. As the results of the study are limited to the sample, they may not be generalized to the entire society.

What is already known on this subject?

Pandemic led to the deterioration of physical and mental health of the individuals by influencing daily life deeply across the world. Compulsory quarantines and restrictions to protect public health implemented for a long time gave rise to psychological disorders, fall in physical activities, sleep problems, and changes in dietary habits and body weight. Psychological problems such as anxiety, depression, stress, fear and poor sleep quality and physical restrictions may cause changes in individuals' eating habits or trigger emotional eating. Emotional eating, changes in mood and sleep pattern, alone or in combination, may lead to short-term or long-term health problems such as obesity, diabetes, hypertension, and coronary artery disease. Fear, sleep quality and emotional eating have been evaluated in different studies during the pandemic. However, so far, no study has evaluated the collective effect of fear of COVID-19, sleep quality, and sociodemographic characteristics such as age, gender, BMI on emotional eating.

What this study adds?

If emotional eating and the factors that cause emotional eating are put under control, then the health problems likely to arise from emotional eating can be prevented. To this end, firstly, it is necessary to identify the factors inducing emotional eating and to take initiatives aiming to control these factors. The fear of COVID-19 alone has a minimal effect on emotional eating but it does not affect emotional eating when it comes together (sleep quality, BMI, age and gender) with other variables. It was determined with this study that during the pandemic period, high fear of COVID-19, poor sleep quality, high BMI, young age and being a woman can contribute to emotional eating. This research proposes especially with high COVID-19 fear, low sleep quality, high BMI and those who are young and female should be screened in terms of emotional eating during the pandemic in the society.

Conclusion

In this study, more than half of the individuals had low sleep quality and one-third of them exhibited emotional eating behavior during a quarantine. The fear of COVID-19 alone has a minimal effect on emotional eating but it does not affect emotional eating when it comes together with variables like sleep quality, BMI, age and gender. When variables such as fear of COVID 19, sleep quality, being young, being a woman and having a high body mass index come together, they affect emotional eating. In line with these results, all individuals in the society, especially those with high COVID-19 fear, low sleep quality, high BMI and those who are young and female should be screened in terms of emotional eating during the pandemic and they should be provided with an education of adequate and balanced nutrition. Additionally, it is recommended to implement interventions to increase the sleep quality of individuals during the COVID-19 pandemic and to provide psychological support.

Declarations

Author contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Havvanur YOLDAS ILKTAC, Cemile SAVCI and Ayse CIL AKINCI. The first draft of the manuscript was written by Havvanur YOLDAS ILKTAC and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Ethics approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Approval was obtained from the ethics committee of Istanbul Medeniyet University Social and Human Sciences Ethics Committee (27.10.2020/38) and Scientific Research Platform of the Ministry of Health of Turkey (2020-10-22T19_39_16). Written informed consent was obtained from all subjects.

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Conflicts of interest

The authors declare no conflict of interest.

Financial interests

The authors have no relevant financial or non-financial interests to disclose.

Availability of data and material

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Code availability

Not applicable

Consent to participate

Informed consent was obtained from all individual participants included in the study.

Consent for publication

Additional informed consent was obtained from all individual participants for whom identifying information is included in this article.

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