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Applied nutritional investigation

Examination of eating and nutritional habits in health care workers during the COVID-19 pandemic

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ARTICLE INFO

Article History:

Received 22 April 2022

Received in revised form 19 August 2022

Accepted 22 August 2022

Keywords:

Emotional eating
Perceived stress
Nutritional changes
Economic concern
Water concern
Food concern
COVID-19

ABSTRACT

Objectives: Health care workers are in the high-risk group in terms of contracting infection because of their role in providing care to patients with COVID-19. We aim to examine the relationship between perceived stress, emotional eating, and nutritional habits in health care workers during the COVID-19 pandemic.

Methods: A cross-sectional study was conducted through an online survey in Turkey between July 1, 2021 and August 15, 2021. Overall, 405 participants age 19 to 67 y completed an online survey incorporating the Emotional Eating Scale (Cronbach's $\alpha = 0.84$), Perceived Stress Scale (Cronbach's $\alpha = 0.84$), and Nutrition Change Process Scale (Cronbach's $\alpha = 0.90$). We gathered data on weight, height, and changes in eating habits during the pandemic to analyze how the pandemic affected dietary and nutritional practices.

Results: The majority of respondents were female (67.7%). Most respondents (58%) reported changing their eating and nutritional habits during the pandemic. Economic concern and concern about finding food and water due to COVID-19 were found to affect changes in eating and dietary habits (odds ratio [OR]: 2.55; 95% confidence interval [CI], 1.69–3.84; $P < 0.001$ and OR: 2.1; 95% CI, 1.39–3.18; $P < 0.001$, respectively). Losing a loved one because of COVID-19 was determined as an independent risk factor for eating and dietary habits (OR: 29.5; 95% CI, 2.23–38.9; $P = 0.010$).

Conclusions: Perceived stress and emotional eating are related to changes in eating/dietary habits among health care workers during the pandemic. We recommend healthy food choices and increased physical activity to reduce emotional eating and mitigate stress.

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Introduction

Public health measures designed to prevent the spread of COVID-19, such as travel restrictions, quarantine practices, curfews, and social distancing rules, have been implemented worldwide. In this respect, the pandemic is not only about physical health, but also changes individual and social attitudes and behaviors, interrupts daily life globally, and affects mental health. The World Health Organization has defined health care workers as a group at risk of developing physical/mental problems due to working directly or indirectly with patients [1]. Frontline health care workers are exposed to additional stressors (e.g., exposure to stigma, social isolation, working with personal protective equipment, constant vigilance) and changing work patterns during the pandemic. Studies have revealed that social isolation as a result of social distance rules and quarantine practices is associated with increased inactivity and unhealthy diets [2,3]. In addition, concerns

exist that the adverse emotional effects of the pandemic and the measures taken will cause changes in eating behaviors or exacerbate eating disorder symptoms [4].

The danger and perceived stress created by a visible or invisible enemy encountered unexpectedly, as well as being unprepared, can lead to different emotions, thoughts, and behaviors [5]. Emotional eating is defined as a tendency to overeat as a coping mechanism to regulate and reduce negative emotions, such as depression, anxiety, and stress [6]. Numerous psychological and physiological hypotheses have been proposed to explain the relationship between stress and emotional eating. Emotional eaters have been shown to think that eating is the apparent solution to their negative feelings caused by stress [7]. Positive relationships have been reported between maladaptive coping strategies (e.g., suppressing emotions, relying on emotion-focused coping, avoiding stress by distracting) and emotional eating [8]. As a result, stress affects the food choices and eating behaviors of individuals.

Changing daily routines and working hours cause social isolation, decreased activity, restless sleep, and difficulties maintaining

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a healthy lifestyle with eating habits. At such times, individuals are not expected to behave as they did before, and new rules may be discovered, including those that shape their food choices. One study determined that participants tended to overeat because of negative emotions, such as loneliness, stress, and depressed mood, and the majority of participants had emotional eating tendencies [9]. In another study, the frequency of eating habits being affected by negative emotions during the pandemic quarantine was 45.3% [10]. In a study of 22 374 participants during the pandemic lockdown, participants with depressive symptoms reported more changes in eating habits, and loneliness was associated with more eating [11].

Studies on eating and dietary habits involving different segments have been conducted. However, to our knowledge, no study has been conducted to examine the relationship between perceived stress, emotional eating, and nutritional habits in health care workers during the pandemic. In this study, we aim to examine the relationship between perceived stress, emotional eating, and nutritional habits in health care workers during the COVID-19 pandemic. Understanding the effects of the COVID-19 pandemic on the stress levels of health care workers is imperative. We believe that determining the effects of risk factors related to the stress levels of health care workers on eating and dietary habits during such periods will contribute to the prevention of risks in similar situations in the future.

Methods

Study design

A cross-sectional study was conducted through an online survey between July 1, 2021 and August 15, 2021 while the pandemic was still ongoing. A total of 405 health care professionals who worked in different public hospitals and hospital units in various parts of the country agreed to participate in the study and took part in the survey. The participants were asked to complete four self-reported phases of the questionnaire via the Google forms online platform, which took approximately 10 min to complete.

The first phase collected general demographic information, information on COVID-19, and the nutrition of the responders. The other sections consisted of the Perceived Stress Scale (PSS), Emotional Eating Scale (EES), and Nutrition Change Process Scale (NCPS), whose validity and reliability were validated in previous studies. Moving on to the next question was impossible without answering the current question, so 405 health care professionals included in the study completed the entire survey and their data were analyzed. Links expired upon completion of the survey; thus, participants could complete the survey only once and were allowed to terminate the survey at any time as desired. The survey was anonymous and confidential.

The invitation to fill out the questionnaire was sent via WhatsApp health workers groups, social networks, and e-mail. Participants were asked to forward the questionnaire to as many people as possible. The snowball sampling technique was used in the study. Before starting the survey, each participant was asked to review the purpose of the study, and then give informed consent. Participants were informed that their participation in the study was entirely voluntary, and did not receive any remuneration for their participation in the study. The study was conducted per the guidelines of the Declaration of Helsinki, and approved by our institution's clinical research ethics committee (protocol number 13/221; June 10, 2021).

Inclusion and exclusion criteria

The inclusion criteria were individuals working at a public hospital, taking an active role in public hospital activities during the pandemic process, age > 18 y, agreeing to participate in the research, and signing the consent form. Those who did not have an active role at their hospital during the pandemic, did not sign the participation form, or did not fill out the scale questions duly were excluded from the study.

Query variables

General and sociodemographic information

Participants answered questions about whether they had a chronic illness, had a diagnosed mental health problem in the past or currently, or are currently receiving treatment. Cigarette and alcohol use and changes during the pandemic, occupation, time spent in the profession, working hours, and working order were

questioned. Age was reported by the person, and sex was recorded as male, female, or other. Marital status was divided into married, single, and divorced/widowed groups. Participants were asked to indicate their number of children, if any.

Information on COVID-19

Participants were asked whether they worked on the frontline and whether they became infected with COVID-19, as well as how severe their COVID-19 symptoms were. Also, participants were asked whether relatives had become infected with COVID-19, they had lost a relative because of COVID-19, they were worried about transmitting the virus to relatives, and they had economic and water/food concerns about the future due to COVID-19. In addition, participants were asked from which sources they followed information about the pandemic.

Information on COVID-19 and nutrition

Participants were asked to indicate their height and weight and whether their weight had changed during the pandemic. Body mass index (BMI) was calculated with the formula of weight (kg)/height (m)² for the reported height and weight, and participants were divided into two groups: BMI ≤25 and > 25 kg/m².

Participants were asked if, during the pandemic, there were changes in nutritional habits and what kind of changes occurred (e.g., increase in number of meals, increase in fatty food consumption, increase in junk food consumption, decrease or increase in consumption of tea and coffee, increase in consumption of excessive sugary carbohydrate food, bake bread at home, eat more unhealthy, order food more frequently, acquire night-eating behavior, frequency of online grocery shopping, increase behavior of washing food and packaged foods). In addition, the survey asked whether there was a change in water consumption and eating habits, whether there was supplemental food use, whether there were foods that they believed protected them from disease, what kind of supplement they used, and whether they ate at the same table as relatives.

Assessment of perceived stress

The 14-item PSS was used in the study, which has been validated previously as a classical stress assessment tool, and Turkish validity and reliability have also been confirmed. The Cronbach alpha internal consistency reliability coefficient for the Turkish versions of the PSS-14 was 0.84 [12,13]. Questions were related to specific stressors or thoughts related to stressful events during the previous month, addressing chronic and acute effects and responses to potentially stressful events and activities. Participants were asked to respond according to their feelings and thoughts about COVID-19 during the last 1 mo, and choose incidence on a five-point Likert scale ranging from never (0 points) to very often (4 points). Seven questions were scored reversely. Total scores range from 0 to 56, and high scores indicate an excess of perception of stress.

Assessment of emotional eating

The EES, which was developed by Garaulet et al. (Turkish validity and reliability study by Arslantaş et al.) consists of 10 items and three subdimensions (inability to prevent desire to eat, food types, feeling of guilt), and also includes anger, anxiety, and low mood items. A self-report scale evaluates the tendency to overeat in response to negative emotions. The Cronbach alpha internal consistency reliability coefficient for the Turkish versions of the PSS-14 was 0.84 [14,15]. Questions have four options and are answered on a Likert-type scale as never (0 points), sometimes (1 point), usually (2 points), and always (3 points). Points between 0 and 30 can be taken from the scale, and high scores (≥21) indicate that the person is confident in using food to help manage emotions.

Assessment nutrition processes of change

In our study, the NCPS was used as a standard measurement tool to show change in nutrition. The NCPS was developed by Prochaska et al., and validated and made reliable in Turkish by Menekli and Fadiloğlu. The Cronbach alpha internal consistency reliability coefficient for the Turkish versions of the PSS-14 was 0.90 [16,17]. The scale consists of 48 items, and has 12 subdimensions (increase in consciousness, dramatic help/emotional stimulation, reevaluation of environment, self reappraisal, social freedom/liberty, opposition/opposition, helping relationships, empowerment management, self liberation, stimulus, control, interpersonal system control, drug use). Each statement was answered using a five-point Likert-type scale as never (1 point), rarely (2 points), sometimes (3 points), often (4 points), and very often (5 points). The highest score for all subdimensions is 20, and the lowest is four. Scores were calculated by dividing the score from all items by the number of items. Higher scores indicate more positive values for change.

Statistical analysis

An analysis of all data was performed using SPSS, version 21.0. Categorical data are expressed as numbers and percentages. The distribution of numerical data was evaluated in terms of normal distribution with Kolmogorov–Smirnov and Shapiro–Wilk tests. Customarily distributed numerical data are presented as mean ± standard deviation, and data not showing a normal distribution are

presented as median (range). Differences in scores between the groups were compared with independent groups *t* test in pairs and an analysis of variance test in more than two groups. The correlation between the scale results was examined with the Pearson correlation test. A logistic regression analysis was performed to determine the risk factors that may affect dietary habits during the pandemic. All general sociodemographic data, information on COVID-19, and nutrition were inserted into the eating-related univariate analysis to investigate factors that change eating habits. The multivariate logistic regression analysis included those variables that were significant in this analysis.

Results

General characteristics

A total of 405 health care professionals, including 283 women (69.9%) and 122 men (30.1%) with a mean age of 39 y (range, 19–67 y) serving during the pandemic period, participated in the study. Of the participants, 58% (*n* = 235) reported a change in their eating and nutritional habits during the pandemic. The majority of participants were married (*n* = 303; 74.8%), and had a median of 1 child (range, 0–4 children). More than half of the participants (*n* = 238; 58.8%) were specialists, 24.7% (*n* = 100) were dentists, 6.7% (*n* = 27) were residents, 4.4% (*n* = 18) were general practitioners, and 5.4% were other health care personnel. The average time spent in the profession was 14.27 ± 8.69 y, and 251 participants (62%) stated that they worked during the day, 152 (37.5%) worked in shifts, and 2 (0.5%) worked at night.

In addition, 57.6% of participants (*n* = 233) had never smoked, 26.4% (*n* = 107) are still using tobacco products, and 16% (*n* = 65) had quit smoking. With regard to alcohol consumption, 37.8% of participants (*n* = 153) still consumed alcohol and 25.5% increased their alcohol intake during the study period. Moreover, 74.8% of participants (*n* = 303) did not have a chronic disease, and 29.1% (*n* = 118) had previously received psychiatric treatment, with 15.3% treated for depression and 9.4% for anxiety. The responses also showed that 15.3% of participants (*n* = 62) were still receiving psychiatric treatment, and the most common diagnosis (*n* = 35; 56.5%) was an anxiety disorder.

Changes in the presence of a chronic disease, smoking behavior, and obtaining mental assistance during the pandemic, as well as BMI and PSS, NCPS, and EES scores among persons who stated their eating and nutritional habits had or had changed were also observed. The general characteristics of participants with or without a change in eating and nutritional habits are shown in Table 1.

COVID-19 pandemic-related parameters

Although 53.3% (*n* = 216) of participants work in positions that do not require contact with patients infected with COVID-19, 46.7% (*n* = 189) work in one-on-one contact with patients who are infected. Moreover, 24.2% of participants had a COVID-19 infection, and 86.7% (*n* = 85) of those infected were treated at home, 9.2% (*n* = 9) were hospitalized, and 4.1% (*n* = 4) had inpatient treatment. Also, 51.4% of participants (*n* = 208) stated that they did not receive psychiatric support during the pandemic, 33.6% (*n* = 136) stated that they needed support but did consult with a psychiatrist, and 15.1% (*n* = 61) received psychiatric support.

Of the responding health care workers, 70.1% (*n* = 284) had at least one relative infected with COVID-19, and 22% (*n* = 284) had at least one relative who had died (*n* = 89) because of COVID-19 infection. Furthermore, 94.6% and 92.1% of participants, respectively, were concerned about relatives having COVID-19 or transmitting COVID-19 to relatives. The fear of infecting relatives with COVID-19 was reported in 93.1% of frontline workers, and 91.2% of other health care workers also feared infecting relatives regardless of their work on the frontline (*P* = 0.300).

Although 59.5% of participants (*n* = 241) experienced economic anxiety for the future, 42.7% (*n* = 173) were worried about finding food/water. Among the 107 smokers, 47.7% stated there was no change in their tobacco use during the pandemic, and 43.9% reported an increase in the number of cigarettes they smoked. When looking at the source where participants follow the pandemic, 38.8% follow social media, 25.7% follow television/radio, 24% use print media, 3.5% get information from relatives, and 8.1% do not follow the news about the pandemic. Participants who follow information about the pandemic on social media (*n* = 157; 25.7%) follow Facebook (44.6%), Twitter (24.2%), Telegram (12.7%), and WhatsApp (5.1%), and 62.4% of those who follow the news on social media state that their anxiety has increased with this news.

Among those who stated that their eating and nutritional habits had or had not changed, there was also a change in relatives having a COVID-19 infection, the loss of a relative because of COVID-19, economic anxiety about the future due to COVID-19, and worry about finding food/water. Table 2 compares COVID-19 infection and pandemic details among those who reported that they had or had not changed their eating and nutritional habits.

Changes in nutrition and eating during COVID-19 pandemic

The mean BMI of participants was 25.06 ± 4.32 kg/m². When considering weight changes during the pandemic, 51.4% of participants (*n* = 208) stated that

they had gained weight, 17.8% (*n* = 72) had lost weight, and 30.9% (*n* = 125) had no change in weight. In addition, 58% of participants (*n* = 235) reported a change in eating and nutritional habits during the pandemic. Although 60.3% of participants working in one-on-one contact with patients infected with COVID-19 said there was a change in their eating habits, the rate was 56% in health care workers who did not work on the front lines, so there was no statistically significant difference (*P* = 0.220). Also, 84.2% of those still diagnosed with depression said they had a change in nutrition during the pandemic, which was 56.7% in other participants (*P* = 0.013). Moreover, 57.9% of participants who said that there was a change in their eating and nutritional habits reported weight gain compared with 42.4% in those whose eating habits had not changed (*P* < 0.001).

Weight did not change in 46.8% of participants whose eating habits did not change, and remained constant in 19.6% of those who said their eating habits had changed (*P* < 0.001). When looking at areas of changing eating habits, 17.1% of the participants' number of meals, 21.2% of participants' amount of carbohydrate consumption, 14.3% of participants' number of sweets, 8.6% of participants' amount of sugar consumption, and 19.5% of participants' consumption of junk food increased. In addition, 33.3% of participants' water consumption, 8.6% of participants' consumption of fatty food, and 19% of participants' consumption of tea and coffee increased. The responses also showed that 8.4% of participants increased their food ordering from outside, and 16% did their grocery shopping online. On the other hand, 13.1% of participants ate at night, 17.5% washed food and packaged foods, 6.9% started making bread at home, and 6.7% avoided eating at the same table as relatives. Also, 13.1% of participants started eating more unhealthy.

During the pandemic, the rate of participants who increased their consumption of junk food and tea/coffee was 33.6% and 32.8%, respectively (*P* < 0.001). There was no difference in sex, with 19.4% female and 19.7% male participants whose consumption of junk food increased (*P* = 0.528). In addition, 43.2% of participants stated that they ate foods that they believed protected them from disease. For this purpose, the most consumed foods were fresh vegetables and fruits, ginger, turmeric, onion, and garlic. Also, 53.6% of participants stated that they used food supplements, and the most frequently used food supplements were vitamins D and C, with the rates of 42.5% and 40.5%, respectively.

Correlation of scale scores of perceived stress, emotional eating, and nutritional change processes

The mean PSS score for the entire group was 26.28 ± 7.26 , the mean EES score was 10.83 ± 6.03 , and the NCPS mean score was 103.24 ± 30.28 . The mean score of the PSS was lower in married participants than in single and divorced or widowed participants (*P* = 0.004). The mean score obtained from the PSS was lower in those who quit smoking compared with current smokers and nonsmokers (*P* = 0.013). Participants who had not changed the number of cigarettes they smoked during the pandemic had a lower PSS mean score than the group that had changed their number (*P* < 0.001). During the pandemic, no significant difference was found between smoking behavior and EES and NCPS scores.

The mean score of the PSS was higher in participants who needed psychiatric support during the pandemic than in those who did not (*P* < 0.001). The mean score of the PSS was found to be higher in those who were still receiving psychiatric treatment compared with those who are not, and those with an average working time of <14 y in the profession (*P* = 0.001 and 0.012, respectively). The PSS mean score of participants who did not change in weight during the pandemic was found to be significantly higher compared with those who indicated a weight change (*P* < 0.001).

Emotional eating was significantly higher in women than in men (*P* = 0.019). The mean scores of the EES were the highest in those who needed psychiatric support, but did not consult with a psychiatrist during the pandemic compared with those who received support. Emotional eating was also higher in participants with BMI >25 kg/m² than those with BMI ≤25 kg/m². Similarly, BMI was higher in those who stated that they had gained weight during the pandemic compared with those who lost weight or did not report any changes (*P* < 0.001). The mean EES score of participants with an increased consumption of fatty foods was 15.31 ± 5.34 , and the mean EES score of those whose fatty food consumption did not increase was 10.41 ± 5.93 (*P* < 0.001). Although the mean EES score of participants whose carbohydrate consumption increased was 15.28 ± 5.6 , the mean EES score of those whose carbohydrate consumption did not increase was 10.25 ± 5.85 (*P* < 0.001). In addition, although the mean EES score of participants with increased sugar consumption was 14.79 ± 5.69 , the mean EES score of those whose sugar consumption did not increase was 10.25 ± 5.85 (*P* < 0.001). The mean EES score of participants who reported increased night-time eating was 14.96 ± 6.59 , but the mean EES score of those whose night-time eating did not increase was 10.21 ± 5.7 (*P* < 0.001). Also, the mean EES score of participants with increased consumption of junk food was 14.15 ± 5.64 , but the mean EES score of those whose consumption of junk food did not increase was 10.03 ± 5.85 (*P* < 0.001).

Similar to perceived stress, the mean score of the NCPS was higher in participants who needed psychiatric support but did not consult with a psychiatrist during the pandemic compared with those who received support and did not (*P* = 0.003). Compared with the group with BMI ≤25 kg/m² and those who stated

Table 1
General characteristics of participants with and without change in eating and nutritional habits

	Changing nutritional and eating habits, n (%) (n = 235)	Eating and nutrition habits unchanged, n (%) (n = 170)	P-value
Sex			
Female	166 (70.6)	117 (68.8)	0.742
Male	69 (29.4)	53 (31.2)	
Occupation			
Specialist, M.D.	138 (58.7)	100 (58.8)	0.471
General practitioner, M.D.	34.1 (3.8)	9 (5.3)	
Research assistant, M.D.	12 (5.1)	15 (8.8)	
Dentist	63 (26.8)	37 (21.8)	
Other hospital staff (nurse, physiotherapist, laboratory)	13 (5.5)	9 (5.3)	
Shift schedule			
Day	138 (59.1)	112 (65.9)	0.215
Night	2 (0.9)	0 (0)	
Day and night rotation	94 (40)	58 (34.1)	
Marital status			
Married	171 (72.8)	132 (77.6)	0.496
Single	51 (21.7)	29 (17.1)	
Divorced/widowed	13 (5.5)	9 (5.3)	
Chronic disease			
Yes	72 (30.6)	30 (17.6)	0.004
No	163 (69.4)	140 (82.4)	
Smoking status			
Never	124 (57)	99 (58.2)	0.583
Quit smoking	35 (14.9)	30 (17.6)	
Yes	66 (28.1)	41 (24.1)	
Smoking behavior change during pandemic (n = 107)			
Increased	36 (54.5)	11 (26.8)	0.002
Decreased	7 (10.6)	1 (2.4)	
Quit	1 (1.5)	0 (0)	
No change	22 (33.3)	29 (70.7)	
Alcohol consumption			
Yes	90 (38.3)	63 (37.1)	0.944
No	126 (53.6)	94 (55.3)	
Quit	19 (8.1)	13 (7.6)	
Alcohol consumption behavior change during pandemic (n = 153)			
Increased	32 (35.6)	7 (11.1)	0.003
Decreased	20 (22.2)	20 (31.7)	
No change	38 (42.2)	36 (57.1)	
Prior psychiatric treatment			
Yes	71 (30.2)	47 (27.6)	0.740
No	164 (69.8)	123 (72.4)	
Prior psychiatric diagnosis (n = 118)			
Anxiety	20 (28.6)	18 (37.5)	0.609
Depression	39 (55.7)	23 (47.9)	
Panic disorder	3 (4.3)	4 (8.3)	
Obsessive compulsive disorder	2 (2.9)	1 (2.1)	
Other	6 (8.6)	2 (2.1)	
Psychological support during pandemic			
Needed and supported	43 (18.3)	18 (10.6)	< 0.001
Needed, but not supported	96 (40.9)	40 (23.5)	
Not needed	96 (40.9)	112 (65.9)	
Ongoing psychiatric treatment (n = 62)			
Yes	44 (18.7)	18 (10.6)	0.026
No	191 (81.3)	152 (89.4)	
Present psychiatric diagnosis			
Anxiety	23 (52.3)	12 (66.7)	0.040
Depression	16 (36.4)	3 (16.7)	
Panic disorder	1 (2.3)	3 (16.7)	
Obsessive compulsive disorder	1 (2.3)	0 (0)	
Other	3 (6.8)	0 (0)	
	Mean or median	Mean or median	
Age, y*	39.82 ± 9.68	40.33 ± 8.89	0.747
Working time, y	15.23 ± 9.06	16.9 ± 8.08	0.091
Shift hours [†]	8 (5–24)	8 (4–24)	0.766
Number of children	1 (0–3)	1 (0–4)	0.540
Years of smoking	11.36 ± 8.24	13.64 ± 8.08	0.076
Body mass index, kg/m ²	25.88 ± 4.13	25.67 ± 4.15	0.012
Perceived Stress Scale	27.9 ± 6.4	24.4 ± 7.69	< 0.001
Nutrition Change Process Scale	109.95 ± 29.79	95.37 ± 32.05	< 0.001
Emotional Eating Scale	11.89 ± 6.34	8.99 ± 5.81	< 0.001

M.D., medical doctor.

Categorical variables are compared with χ^2 or Fisher's Exact test. Continuous variables are compared by independent samples *t* or Mann–Whitney U test according to the normality status of the variable.

*Independent samples *t* test.

[†]Mann–Whitney U test used for comparison.

Table 2
Comparison of details about COVID-19 infection and pandemic between participants with and without change in eating and nutritional habits

	Changing nutritional and eating habits, n (%) (n = 235)	Eating and nutrition habits unchanged, n (%) (n = 170)	P-value
Working in COVID-19 unit			
Yes	114 (48.5)	75 (44.1)	0.420
No	121 (51.5)	95 (55.9)	
Prior COVID-19 infection			
Yes	57 (24.3)	41 (24.1)	0.535
No	178 (75.7)	129 (75.9)	
Clinic of COVID-19 infection (n = 98)			
Not hospitalized	47 (82.5)	38 (92.7)	0.180
Hospitalized with moderate symptoms	6 (10.5)	3 (7.3)	
Hospitalized with severe symptoms	4 (7)	0 (0)	
COVID-19 infection in relatives			
Yes	177 (75.3)	107 (62.9)	0.008
No	58 (24.7)	63 (37.1)	
Death of relative caused by COVID-19			
Yes	61 (26)	28 (16.5)	0.028
No	174 (74)	142 (83.5)	
Source of information about pandemic			
Social media	89 (37.9)	68 (40)	0.800
Television/radio	60 (25.5)	44 (25.9)	
Press	55 (23.4)	42 (24.7)	
Relatives	10 (4.3)	4 (2.4)	
Not interested	21 (8.9)	12 (7.1)	
Most used social media for pandemic follow up (n = 157)			
Facebook	13 (14.6)	7 (10.3)	0.218
Twitter	38 (42.7)	32 (47.1)	
Instagram	18 (20.2)	20 (29.4)	
Telegram	0 (0)	1 (1.5)	
Whatsapp	13 (14.6)	7 (10.3)	
Other	7 (7.9)	1 (1.5)	
Influence of pandemic in social media on participants (n = 157)			
Increasing anxiety	57 (64)	41 (60.3)	0.611
Decreasing anxiety	3 (3.4)	1 (1.5)	
No influence	29 (32.6)	26 (38.2)	
Concern about relatives being infected with COVID-19			
Yes	225 (95.7)	158 (92.9)	0.268
No	10 (4.3)	12 (7.1)	
Concern about infecting relatives with COVID-19			
Yes	220 (93.6)	153 (90)	0.196
No	15 (6.4)	17 (10)	
Economic concern for future due to COVID-19			
Yes	162 (68.9)	79 (46.5)	< 0.001
No	73 (31.1)	91 (53.5)	
Concern about finding food and water for future due to COVID-19			
Yes	118 (50.2)	55 (32.4)	< 0.001
No	117 (49.8)	115 (67.6)	

Categorical variables are compared by χ^2 or Fisher's Exact test.

that they gained weight during the pandemic, participants with a BMI >25 kg/m² had higher NCPS scores than those who did not have a change in weight ($P < 0.001$). When examining occupational distribution, the NCPS average score of dentists is higher than that of the other occupational groups ($P = 0.015$).

A statistically significant positive correlation was found between all scale results (Table 3). The results of all scales were significantly different from each other compared with the group that did not have concerns about finding water and food for the future (Table 4).

Regression analysis results

A logistic regression analysis was performed to investigate factors that may affect eating habits during the pandemic. First, to investigate factors that affect

changes in eating habits during the pandemic, all general sociodemographic characteristics of the participants (age, sex, occupation, marital status, smoking and alcohol use), medical history (COVID-19 infection, chronic illness, psychiatric diagnosis), COVID-19-related professional experience (working on frontline), and data on changes in eating and dietary habits during the study period were evaluated with a univariate logistic regression analysis. Factors found to be significant were analyzed in a multivariate logistic regression analysis. In the results of the univariate analysis, receiving psychiatric support, still receiving psychiatric treatment, chronic disease, changes in cigarette use during the pandemic, increased alcohol consumption, loss of a loved one because of COVID-19, fear of future economic situation, and fear of finding food/water due to COVID-19 were determined to be affecting factors. BMI effectively changed eating habits ($P < 0.001$). As a result of the multivariate analysis, only losing a loved one because of COVID-19 was

Table 3
Correlation coefficients between three scale scores

	Nutrition Change Process Scale	Emotional Eating Scale
Perceived Stress Scale	0.149 ($P = 0.003$)	0.238 ($P < 0.001$)
Emotional Eating Scale	0.238 ($P < 0.001$)	–
Nutrition Change Process Scale	–	0.575 ($P < 0.001$)

Pearson correlation test was used to evaluate the correlations.

Table 4
Comparison of scale results between participants concerned and not concerned about nutrition and finding water

	Concerned	Not concerned	P-value
Perceived Stress Scale	28.56 ± 6.44	24.57 ± 7.39	< 0.001
Emotional Eating Scale	12.31 ± 6.39	9.73 ± 5.51	0.001
Nutrition Change Process Scale	108.99 ± 29.95	98.95 ± 29.86	< 0.001

Table 5
Uni- and multivariate logistic regression analyses for changing nutrition behaviors during pandemic

	Univariate		Multivariate	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Psychological support during pandemic	2.79 (1.85–4.21)	< 0.001	4 (0.72–22.09)	0.111
Ongoing psychiatric treatment	1.94 (1.08–3.50)	0.027	0.77 (0.11–5.05)	0.790
Chronic disease	0.48 (0.3–0.78)	0.003	1.01 (0.2–4.96)	0.987
Smoking behavior change during pandemic	4.83 (2.07–11.25)	< 0.001	1.94 (0.33–11.19)	0.456
Increased alcohol consumption	4.41 (1.80–10.81)	0.001	2.55 (0.4–16.07)	0.319
COVID-19 infection in relatives	1.79 (1.16–2.76)	0.008	2.83 (0.62–12.88)	0.179
Death of relative caused by COVID-19	1.77 (1.07–2.92)	0.024	29.5 (2.23–38.9)	0.010
Economic concern for future due to COVID-19	2.55 (1.69–3.84)	< 0.001	4.64 (0.88–24.27)	0.069
Concern about finding food and water due to COVID-19	2.1 (1.39–3.18)	< 0.001	0.32 (0.05–1.84)	0.205
Body mass index group	0.6 (0.4–0.9)	0.014	0.69 (0.16–2.91)	0.623

CI, confidence interval; OR, odds ratio.

determined to be an independent risk factor (odds ratio: 29.5; 95% confidence interval, 2.23–389; $P = 0.010$). The analysis results are shown in Table 5.

Discussion

The findings obtained from our study's analyses are that the pandemic created a change in health care workers' eating and nutritional habits. To the best of our knowledge, no study has investigated the relationship between perceived stress, emotional eating, and nutritional habits in health care workers during the COVID-19 pandemic.

Perceived stress and emotional eating

Identifying the underlying causes and risk factors for changes in food choices and dietary habits is crucial, so appropriate interventions can be developed for health care workers in similar situations during the COVID-19 outbreak and beyond [9]. Along with the pandemic, severe changes in the quantity of consumed food by health care workers can affect overall nutritional quality and future body weight management. Therefore, the findings that many individuals experienced changes in eating and eating habits raise concerns [3].

In our study, 58% of health care workers reported a change in eating and nutritional habits during the pandemic. When considering weight changes during the pandemic, 69.2% of participants stated that there was a weight change during this period, and this change was mainly in the form of weight gain. Diet-related conditions, such as obesity, are a risk factor for hospitalization with COVID-19; thus, there is a need for interventions to encourage individuals to eat healthier with changing dietary patterns and broader food system changing to promote healthy eating.

The tendency to eat in response to perceived stress is linked to weight gain. One study showed that participants tended to overeat because of negative emotions, such as loneliness, stress, and depressive mood. In addition, the majority of participants were prone to emotional eating [11]. In our study, the mean score of the PSS in health care workers was 26.28 ± 7.26 , and was higher in those who had a change in cigarette use during the pandemic, were still under psychiatric treatment, worked in the profession for <14 y, and did not have a change in weight.

Studies have shown that emotional eating is positively associated with BMI, stress, and depression [7,18]. In our study, emotional eating was higher in participants who needed psychiatric support but did not consult with a psychiatrist during the pandemic. In accordance with the literature, 51.4% of participants in our study stated that they had gained weight during the pandemic. Participants with a BMI >25 kg/m² stated that they had gained weight during the pandemic and are more emotional eaters.

Compared with men, women are at a higher risk of developing abnormal eating habits and eating disorder-related health problems that may be precipitated or exacerbated by the pandemic [19]. Many studies show that women are more affected by emotional eating, which leads to more weight gain than men [20,21]. Another finding of our study was that emotional eating was significantly higher in female than in male health care workers.

Previous studies have reported that stress motivates the consumption of highly palatable foods and negatively affects dietary behaviors through reward signaling pathways in the brain [22]. In an Italian study, approximately half of 602 participants stated that they increased their food intake to feel better and used food in response to anxious feelings. The study determined that women are more prone to anxiety and consuming comfort foods than men. Younger age, lower BMI, less anxiety, and less food intake for satiation have been shown to be predictors of overnutrition control [23]. In our study, the mean EES scores of participants whose fatty food consumption, carbohydrate consumption, sugar consumption, night-time eating, and junk food consumption increased were statistically significantly higher.

Many studies in the literature reveal that mechanisms supporting various psychosocial disorders, such as anxiety, depression, and stress, are associated with eating disorders [24–30]. Another finding of our study was a significant correlation between the scale mean scores of perceived stress, emotional eating, and nutritional change processes, showing that the COVID-19 pandemic affected emotional eating and changes in eating and eating habits mediated by psychological distress. A recent systematic review of experimental studies shows that participants triggered by negative emotions tended to score higher on the EES and eat more energy-dense food than controls who experienced neutral emotions [31].

Food choice, type of consumption, and dietary change

Motivations for food choices always go beyond the nutritional value of food. Early research during the COVID-19 outbreak suggests a relationship between dietary behavior and food choices. Although the consumption of fresh food decreases, the consumption of pasta, flour, and frozen foods has been shown to increase during the pandemic [32,33]. Dietary energy and fat intakes increase under stressful conditions [34,35]. Our study showed that 21.2% of health care professionals increased their carbohydrate consumption during the pandemic period, with 14.3% of participants increasing the consumption of sweets, 8.6% of fatty foods, and 19.5% of junk food.

Perceived stress is associated with emotional eating, and mood is a food choice motive. A study of 800 people showed that perceived stress affects emotional eating and food choices. As a result of the

analysis, mental health, treatment status, and chronic physical illness were found to be effective in changing eating habits. A relationship was also found to be between persistent eating and loneliness, which reflects another commonly observed relationship between obesity and loneliness [11,36]. As shown in the literature, people diagnosed with depression reported that their eating and nutritional habits changed during the pandemic, because they typically were more surrounded by crowds compared with other participants.

During the study period, risk factors, such as being diagnosed with a mental disorder or chronic physical illness before the pandemic, being diagnosed with COVID-19, being treated or staying in quarantine, and losing a relative because of COVID-19, increase the likelihood of being diagnosed with a mental illness [37]. In our study, 24.2% of the health care workers had a COVID-19 infection. In addition, 48.7% of participants stated that they needed psychiatric support during the pandemic. Regardless of their work on the front lines, participants were concerned about relatives being infected with COVID-19 and transmitting the infection. At least one relative of 22% of health care workers died because of COVID-19 infection. An important finding of our study is that the death of a relative because of COVID-19 is an independent risk factor affecting changes in eating habits.

During the pandemic period, curfew affected individuals' food and food choices and daily habits. A study was conducted to examine the dietary habits of individuals who were isolated by staying at home during the COVID-19 pandemic. The frequency of eating habits changes was reported as 45.3%, the frequency of weight gain as 61%, and the frequency of higher consumption of pastry foods as 28%. The researchers of the analysis stated that they agreed with the proposition that "the number of meals increased during the coronavirus pandemic" [38]. A study conducted in the Netherlands evaluated changes in eating behavior and food intake of 1030 people, and 7.1% of those who reported a change in their eating behavior or food intake stated that they ate less healthy food during quarantine. This result is interpreted to mean that COVID-19 will have serious, potential public health consequences, including an increased risk for noncommunicable diseases, such as weight gain, eating disorders, diabetes, or cardiovascular disease [39].

In our study, 13.1% of health care workers reported that they ate less healthily during the pandemic, 8.4% reported that the frequency of ordering food from outside increased, and 16% reported that the frequency of online grocery shopping increased. Increases in online food orders may be related to the demand for staying at home as much as possible, as well as fears of infection in places such as restaurants. As online shopping grows comprehensively worldwide, future trends and related studies will show how the current pandemic period permanently changes how we shop.

In our study, the frequency of participants whose eating habits increased during the pandemic was 33.6%. When the effect of sex in this group was examined, no significant difference was found between the two sexes. More than half of participants in a Canadian study stated that they changed their eating habits, with 57% of women eating more during quarantine and 67% eating more junk food [40]. In addition, an Italian study stated that 46.1% of participants did not change their lifestyle behaviors, and 37.4% and 35.8% stated that they had more and less healthy eating styles, respectively, during the study period [41].

In a study conducted in Saudi Arabia, 66% of participants stated that there was a change in eating times during quarantine, and 57% stated there was a change in the number of meals they consume daily. Reported factors causing this change are boredom, more time to cook, and food safety concerns [42]. In addition, 6.9% of those who reported a change in eating and nutritional habits during the pandemic started to make bread at home, and 17.1%

increased the number of meals. Another study conducted in Poland reported that 43.5% of individuals participating in the study ate more food on curfew days because of COVID-19, and 51.8% consumed snacks more frequently between meals [32].

A study conducted in England reported that 44% of participants enjoyed cooking more, and 47% enjoyed eating with their families and housemates from the moment that the restrictions started because of the COVID-19 pandemic. In our study, 6.7% of health care workers stated that they avoided eating at the same table as their relatives. The deep concern of transmitting COVID-19 to relatives, regardless whether they worked on the front lines or not, affected this change. Altogether, these findings show that different practices in different countries affect eating behaviors differently. Further research should reveal how different quarantine measures affect these putative differences considering both sociocultural factors and COVID-19 severity in the concerned country.

Alcohol consumption is widely used to cope with stress. A study of 2254 participants showed that increased resilience reduced the strength of the relationship between perceived stress and eating behaviors [43]. In our study, 37.8% of participants stated that they used alcohol. Although 25.5% reported that alcohol use increased during the pandemic period, 26.1% reported that alcohol use decreased during this period. The analysis showed no association between perceived stress and alcohol use and changes during the pandemic.

According to the research results, the eating attitudes of individuals who did not have children during the COVID-19 pandemic are more affected than those who have children [9]. No significant difference was found in terms of having children between the groups with and without changes in their eating habits in our study. Change eating habits is more difficult for families with children because of children's diet.

Economic concern of finding food and water due to COVID-19

Qualitative data covering 12 countries in southern Africa reveal that quarantines raise concerns about food safety as health, economic, and human rights/welfare issues, but concerns about the local spread of COVID-19 and the economic effect of the virus increase the possibility of food concern [44]. With access to food and food safety through regulatory measures, such as curfews, the attention is also drawn to economic consequences. In our study, 59.5% of participants experienced economic anxiety, and 42.7% were worried about finding food and water for the future.

A study designed to determine how the pandemic affects food and environmental concerns shows that, although individuals are highly concerned about contracting COVID-19, the majority of participants in the study continued to be intensely concerned about environmental issues, such as climate change [42]. The pandemic also resulted in other eating and food-specific concerns. In our study, 17.5% of participants stated that they started washing food and packaged foods during the pandemic. The fear of contagion due to COVID-19 also caused individuals to experience increasing concerns about food quality or its capacity to be a means of transmission [45].

Strengths and limitations

The study has several strengths. The first strength is that our research focused on health care workers who, together with the magnitude of perceived stress during the pandemic, have a higher probability of emotional eating, changes in eating habits, and have a higher risk of experiencing mental health disorders. Second, this is the first study to examine changes in perceived stress, emotional eating, and nutritional behaviors among health care professionals. Third, the

included survey items explicitly asked for differences in eating and purchasing behavior compared with pre-pandemic behavior, and the study was timed while the pandemic was ongoing.

The study also has limitations. First, because of the study's cross-sectional nature, causal relationships between variables cannot be inferred. A longitudinal study would undoubtedly shed more light on how persistent stress affects emotional eating. The second limitation of the study is that the first part of the questionnaire includes the use of unconfirmed measures to evaluate eating and food-purchasing behavior. Third, all data in the study, including weight and height, were self-reported, so there may be under- or overreporting. For example, as health care workers, participants may be influenced by their correct knowledge of healthy eating rather than their actual behavior, leading to bias. Furthermore, as with all studies based on self-reported data, our results are subject to the influence of response and recall bias. Fourth, this study was conducted by psychiatrists. Among the health care professionals to whom the questionnaire was sent, those who received psychiatric treatment before may be inclined to participate in the study. Also, the survey may have caught the attention and increased the involvement of those obsessed with nutrition and food choices during the pandemic. The study's sample population may limit the research results' generalizability.

Conclusions

This study has up-to-date data to evaluate health care workers' changes in eating and nutritional habits during the COVID-19 outbreak. Furthermore, the study provides relevant empirical evidence for a population of high vulnerability due to its direct work with people affected by different clinical conditions (physical or psychological). According to the study results, more than half of health care workers changed their eating and nutritional habits and gained weight during the pandemic. A striking finding is that, although most health care workers experience economic anxiety due to COVID-19, 42.7% also worry about finding food and water. The stress caused by COVID-19 in health care workers and changes in emotional eating and nutritional habits were found to be related. The relationship between the psychosocial effect of COVID-19 and the change in eating and nutritional habits can be explained by the stress experienced. In addition, receiving psychiatric support, still receiving psychiatric treatment, and chronic disease effectively changed eating habits.

Because emotional eating increases the risk of obesity and may have unfavorable health repercussions among health care professionals in the future, this risk can be avoided during the COVID-19 pandemic by boosting physical activity and decreasing stress levels through dietary and behavioral measures. In addition, public health policies should improve knowledge of good eating and lifestyle behaviors and give health care professionals with obesity, eating disorders, and related mental health issues additional assistance during such periods. The results obtained are also of notable interest since they allow for the design of useful prevention programs (e.g., stress management and resilience training) in future waves because of COVID infection or other situations (especially during stressful events) characterized by high stress levels. However, comprehensive anthropometric measurements and psychiatric evaluation studies are needed to understand this issue better.

Acknowledgments

The authors thank Dr Zümürüt Arda Kaymak at the Süleyman Demirel University Faculty of Medicine for helping with the statistical analysis.

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