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Research Article

Assessment of Adult Individuals' Fear of COVID-19, Healthy Living Behaviors, and Nutrition Knowledge Levels during the COVID-19 Pandemic Period

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ABSTRACT

This study determines the fear of COVID-19, healthy lifestyle behaviors, and nutrition knowledge levels of individuals during the COVID-19 pandemic. The study was conducted involving 509 people between the ages of 18 and 64 from December 2020 to April 2021. Data were collected online using a descriptive characteristics form, the COVID-19 Fear Scale, the Adult Nutrition Knowledge Level Scale, and the Healthy Lifestyle Behaviors Scale II. It was found from the study that women feared COVID-19 more than men ($p<0.05$). Individuals aged 35–44 scored higher in basic nutrition knowledge, while those aged 18–24 scored lower in food preference knowledge ($p<0.05$). It was also found that individuals who were between 55 and 64 years of age, married, highly educated, employed in the public sector, of good economic status, and ill scored higher on the Healthy Lifestyle Behaviors Scale II ($p<0.05$). A weak positive correlation was found between the score of the Fear of COVID-19 Scale and scores of both food preference knowledge and health responsibility sub-dimensions ($r=0.088$, $r=0.181$; $p<0.05$). A weak positive correlation was also found between the nutrition knowledge score as well as the different sub-dimensions and the total score of the Healthy Lifestyle Behaviors Scale II ($r=0.164$, $r=0.196$; $p<0.05$). It was observed that fear of COVID-19, nutrition knowledge level, and healthy lifestyle behaviors were influenced by various socio-demographic characteristics, and that there was a relationship between these three elements.

INTRODUCTION

The new Coronavirus Epidemic (COVID-19), which started in Wuhan, China, and spread worldwide, has led to a change in people's lifestyles (Nugroho *et al.* 2022; Alothman *et al.* 2021). Its high mortality rates, quarantine, social isolation, and worsening economy have caused widespread fear, stress, and anxiety (Pakpour & Griffiths 2020). Measures taken to limit the spread of the outbreak have affected people's physical and mental health, as well as their lifestyle behavior in many ways (Alothman *et al.* 2021). The increase in the time spent at home during the pandemic has caused negative changes in people's lifestyle habits, such as unhealthy nutrition intake, low physical activity levels, and inefficient sleep (Pakpour & Griffiths 2020; Alothman *et al.* 2021).

It is believed that eating delicious food is a strategy to alleviate negative emotions such as anxiety, stress, and fear (Landaeta-Díaz *et al.* 2021). Stress and fear in quarantine may be linked to poor eating behaviors, such as eating even when not feeling hungry, consuming larger portions, and taking unhealthy foods (Pakpour & Griffiths 2020; Landaeta-Diaz *et al*. 2021). In a study by Cecchetto *et al.* (2021), it was found that individuals in COVID-19 quarantine more often displayed emotional and binge eating behaviors relating to stress, anxiety, and depression. In addition to changes in eating habits, restrictions in daily activities caused by isolation and quarantine have caused a great increase in energy imbalance (Landaeta-Diaz *et al*. 2021). Adoption of healthy lifestyle behaviors and an increase in nutrition knowledge levels can play an important role in

the prevention of adverse health consequences arising at this time.

Nutrition knowledge can help individuals to form attitudes and behaviors towards healthy nutrition (Chen & Antonelli 2020). Some studies support the idea that having adequate nutrition knowledge can positively affect nutrition habits (Spronk *et al.* 2014; Barbosa *et al.* 2016). In one systematic review involving adults, higher levels of nutritional knowledge were generally associated with healthier food choices and eating habits (Barbosa *et al.* 2016).

During the COVID-19 pandemic, it is necessary to identify the current situation so that adults can both protect and maintain their health and develop mechanisms to cope with negative feelings (Cecchetto *et al.* 2021). Thus, negative eating habits that may be caused by mental distress can be prevented, and lifestyle can be improved in the fight against future pandemics. The aim of this study is to investigate fear of COVID-19, healthy lifestyle behaviors, and nutrition knowledge during the pandemic period in people aged 18–64 years

METHODS

Design, location, and time

Data collection was performed online between December 2020 and April 2021 through a survey form prepared and created by the researcher based on literature using Google Forms. All participants had read the declaration of consent and expressly agreed to participate before starting the survey. The study protocol was approved by the Ethics Committee of Ankara Yıldırım Beyazıt University (project no: 2020-340) and by the Scientific Research Evaluation Commission of the Health Services General Directorate of the Turkish Ministry of Health (2020-10-18T13_55_56).

Sampling

This study was conducted with 509 individuals aged between 18 and 64 years. The survey form was distributed via social media platforms. The eligibility criteria included being aged 18–64 years, proficiency in Turkish, ownership of a smart phone or computer. Taking into account the Turkey population size, and employing a confidence level of 95% and a sampling error of 5%, the minimum sample size necessary for the study was calculated to be 377.

Data collection

Descriptive characteristics form. This form was used to collect descriptive information on the individuals involved in this study. Their Body Mass Index (BMI) was calculated by the researcher according to their own statements regarding their body weight (kg) and height (cm).

COVID-19 Fear Scale (CFS). This scale was developed in 2020 by Ahorsu *et al.* to determine the level of fear of COVID-19 (Ahorsu *et al.* 2020), and Satıcı *et al.* conducted a Turkish validity and reliability study on it in 2020. The scale uses a five-point Likert scale format and consists of seven items. A high score on the scale indicates a high level of COVID-19 fear (Satici *et al.* 2021).

Adult Nutrition Knowledge Level Scale (ANKLS). This scale was developed by Batmaz and Güneş (2018) to determine individuals' nutrition knowledge levels and later subjected to validity and reliability testing. The scale is in a five-point Likert scale form and has two sections, Basic Nutrition and Nutrition Preference. There are 20 items in the Basic Nutrition section and 12 items in the Nutrition Preference section.

Healthy Lifestyle Behaviors Scale II (HLBS-II). This scale, originally developed in 1987, was updated in 1996 by Walker *et al.* to assess people's health behavior (Walker *et al.* 1987; Walker & Hill-Polerecky 1996). The validation and reliability of the Turkish version was tested by Bahar *et al.* (2008). The scale has a four-page Likert-type format and comprises 52 items in six sub-dimensions: mental development, interpersonal relationships, nutrition, physical activity, health responsibility, and stress management. The possible score range is from 52 to 208.

Data analysis

Data analysis was performed using SPSS (IBM SPSS Statistics, Version 24). The qualitative variable data are summarized as number (S) and percentage (%), while the quantitative variable data are summarized as mean and standard deviation ($\bar{X}$±SD). For normally distributed data, independent samples t-test and ANOVA were employed. For three or more groups, the Tamhane test was performed in a two-way comparison of variables. For non-normally distributed data, the Mann-Whitney U test and the Kruskal-Wallis H test were used. The Bonferroni correction was performed for

the two-way comparison of variables, for which a significant difference emerged for groups of three or more. For categorical variables, the Pearson chi-square test was used to compare between groups, and the Spearman correlation test was used to determine the correlation between quantitative variables. Data analysis was assessed with a 95% confidence interval and a 5% significance level, and statistical significance was accepted as $p<0.05$.

RESULTS AND DISCUSSION

Table 1 presents the socio-demographic characteristics and state of having a disease of the individuals. Of the participants, 58.7% were female with an average age of 30.83±10.40 years. Notably, 54.6% had a BMI within the normal range, but 39.1% mentioned gaining weight during the pandemic.

Table 2 provides the scores of the individuals on the CFS, ANKLS, and HLBS-II. The score obtained on the CFS was 16.97±6.17. The scores obtained from the basic nutrition section and nutrition preference section of the ANKLS were 54.31±7.69 and 37.05±6.29, respectively. The individuals' HLBS-II score was 121.11±19.24. The scores obtained on the sub-dimensions of this scale, health responsibility, nutrition, and physical activity, were 18.51±4.49, 19.99±3.86, and 15.68±5.17, respectively.

Table 3 shows the distribution of the scores obtained from the CFS, ANKLS, and HLBS-II according to the individuals' descriptive characteristics. Women had a significantly higher CFS score than men ($p<0.05$). The basic nutrition knowledge scores of those in the 35–44 years age range were higher, and the nutrition preference knowledge scores of those in the 18–24 years age range were seen to be lower ($p<0.05$). The total HLBS-II score of the individuals in the 55–64 years age range was found to be higher ($p<0.05$). The total points of individuals who were married on both the ANKLS and HLBS-II were significantly higher than those of unmarried individuals ($p<0.05$). It was observed that the total scores of both the ANKLS and HLBS-II for individuals with postgraduate education were notably higher ($p<0.05$). Additionally, those with a reported illness had significantly higher scores than those without ($p<0.05$).

Table 4 examines the correlation between the individuals' CFS, ANKLS, and HLBS-II scores and sub-dimensions. A weak positive significant correlation was observed between the CFS score and nutrition preference ($r=0.088$, $p=0.048$) and the score of only the sub-dimension of health responsibility of the HLBS-II ($r=0.181$, $p<0.001$). Also, weak positive significant correlations were found between the nutrition preference score and health responsibility ($r=0.189$, $p<0.001$), nutrition ($r=0.136$, $p=0.002$), spiritual development ($r=0.151$, $p=0.001$), interpersonal relations ($r=0.139$, $p=0.002$), stress management ($r=0.187$, $p<0.001$), and the HLBS-II total score ($r=0.196$, $p<0.001$).

The COVID-19 pandemic has been unpredictable and has affected the whole world. Its rapid spread, high death rate, uncertain course, and economic disruption have caused fear in the general population (Pakpour & Griffiths 2020). In this study, individuals' CFS score was found to be 16.97±6.17. In March and April 2020 when the outbreak first began, another study conducted in Turkey found a CFS score of individuals of 21.47±6.28 (Korukcu *et al.* 2021). In a similar study conducted in Saudi Arabia with individuals over the age of 18, the CFS score found was 16.28±5.49 (Alothman *et al.* 2021). It is noticeable from the studies conducted that COVID-19 fear levels have changed over time. At the beginning of the normalization process, the progressive fall in death rates and increase in vaccination rates might have reduced the fear levels.

In this study, fear of COVID-19 was higher in women than in men ($p<0.05$). It has been similarly reported in many other studies in the literature that females have greater fear of COVID-19 (Pakpour & Griffiths 2020; Taspinar *et al.* 2021). In a study in Bangladesh in which 8,550 people took part, females reported significantly higher levels of fear of COVID-19 than males (Sakib *et al.* 2022). Females reporting greater fear of COVID-19 may be explained by physiological and psychological differences between the genders. Estrogen levels and hormonal fluctuations can modulate fear responses in women (Maeng & Milad 2015).

In the present study, the basic nutrition information scores of individuals in the 35–44 years age group were higher than those of other age groups, and the nutrition preference information scores of those in the 18–24 years age group were lower than those of other age groups ($p<0.05$). In addition, nutrition preference information scores increased with increasing

Table 1. Distribution of individuals' general descriptive characteristics

General characteristics	Individuals (n=509)	
	n	%
Gender		
Female	299	58.7
Male	210	41.3
Age range (years)		
18–24	159	31.2
25–34	207	40.7
35–44	77	15.2
45–54	48	9.4
55–64	18	3.5
Age (years) ($\bar{X}$±SD)	30.83±10.40	
Marital status		
Married	191	37.5
Single	318	62.5
Education		
Middle school	27	5.3
High school	102	20.0
University degree	288	56.6
Postgraduate	92	18.1
Employment		
Not working	223	43.8
Public sector	148	29.1
Private sector	138	27.1
Chronic illness		
Yes	104	20.4
No	405	79.6
Body mass index range		
Underweight	28	5.5
Normal	278	54.6
Moderately overweight	152	29.9
Obese	51	10.0
Weight change		
Increase	199	39.1
Decrease	110	21.6
No change	200	39.3

$\bar{X}$: Mean; SD: Standard Deviation

age. In a study by Batmaz and Güneş (2018), it was similarly found that scores on nutrition preference increased with age. In a study by Hendrie *et al.* (2008), it was found that nutrition general information increased with age, and that individuals over the age of 35 had a higher level of nutrition knowledge than those who were younger. The low nutrition information scores of individuals in the 18–24 years age range in the present study might be because these individuals had inadequate education on nutrition. In addition, the presence of chronic illnesses which developed with age and the elevation in sociocultural and education levels might have caused the increase in nutrition knowledge levels with increasing age (Tam *et al.* 2021; Akkartal & Gezer 2020).

It is noticeable that although studies conducted before the pandemic reached varying conclusions, it was generally found that females' nutrition knowledge levels were higher (Hendrie *et al.* 2008; Labban 2015). This finding regarding the gender factor may be due to the fact that women attach more importance to healthy nutrition and weight control (Spronk *et al.* 2014; Lee *et al.* 2019). In the present study, no significant difference was found between gender and the nutrition knowledge score ($p>0.05$). Unlike the conclusions of other studies, the conclusions of this study can be explained by the data collected during the pandemic. It was assumed that the pandemic period was an important factor in the increase in the levels of knowledge about healthy eating to strengthen immunity irrespective of gender.

The basic nutrition and nutrition preference scores of those who were married were higher than the scores of unmarried individuals ($p<0.05$). Similarly, it was found in a study by Hendrie *et al.* (2008) that individuals who were married, divorced, or living together with another individual or other individuals had higher levels of nutrition knowledge than those who were unmarried. Marriage potentially offers both economic and social advantages. This increased economic prosperity can improve health outcomes by increasing access to healthcare or reducing stress. Additionally, the partner can play an important role in monitoring and encouraging healthy behaviors (such as good eating habits and regular exercise) (Wood *et al.* 2009).

Existing studies in the literature have shown that education status is an important factor influencing nutrition knowledge levels

Table 2. Distribution of COVID-19 fear scale, adult nutrition knowledge level scale, and healthy lifestyle behaviors scale II scores

Scales	Mean±SD	Median	Lower	Upper
COVID-19 fear scale adult nutrition knowledge level scale	16.97±6.17	16.0	7.0	35.0
Basic nutrition	54.31±7.69	54.0	31.0	76.0
Nutrition preference	37.05±6.29	37.0	8.0	48.0
Healthy lifestyle behaviors scale				
Health responsibility	18.51±4.49	18.0	9.0	30.0
Physical activity	15.68±5.17	15.0	8.0	32.0
Nutrition	19.99±3.86	20.0	10.0	31.0
Spiritual development	24.98±4.82	25.0	10.0	36.0
Interpersonal relations	23.46±4.19	23.0	12.0	35.0
Stress management	18.49±3.91	18.0	9.0	32.0
Total HLBS II	121.11±19.24	120.0	69.0	178.0

SD: Standard Deviation; HLBS-II: Healthy Lifestyle Behaviors Scale II

(Koch *et al.* 2021; Tam *et al.* 2021; Akkartal & Gezer 2020). In the present study, nutrition levels generally rose as education levels rose. Tam *et al.* (2021), who assessed the nutrition knowledge of Australian sportsmen, found that sportsmen with a university education had higher nutrition knowledge scores. These findings have shown that education increases individuals' awareness levels, which represents an important factor in achieving better levels of nutrition knowledge.

In a study by Taş (2021), no statistically significant difference was found when individuals' chronic illness status and nutrition knowledge levels were compared. In the present study, the basic nutrition scores of those with a chronic disease diagnosed by a doctor were higher than those of individuals without an illness ($p<0.05$). The different results seen in the literature on this topic might have derived from whether or not the sick individuals had education, or if they had education, whether it was adequate. Also, the result might have varied according to whether those who were ill had an illness related to nutrition.

The HLBS-II was used to determine the healthy lifestyle behaviors of the individuals included in the study, and their total mean score was found to be 121.11±19.24. Few studies have been in use of this scale with the general population involved (Liu *et al.* 2021; Akgün 2021; Zhou *et al.* 2022). Similar to the present study, Akgün (2021) conducted a study to determine the healthy lifestyle behaviors of individuals above the age of 18 during the pandemic, and the total HLBS-II score was 123.49±18.47. Considering that the score that can be obtained from the HLBS-II may fall in the range of 52–208, it is predicted that adults will need to enhance their health improvement behaviors.

Based on the scores on the sub-dimensions of the HLBS-II, individuals scored the lowest, 15.68±5.17, on physical activity (min score: 8, max score: 32). The fact that existing literature has reported the lowest score on this sub-dimension shows that adults do not incorporate physical activity into their lifestyle (Zhou *et al.* 2022; Alzahrani *et al.* 2019). The reason for this may be that adults do not attach enough importance to physical activity, and that recently developed technology has changed lifestyles. In addition, people spend more time at home and adopt a sedentary lifestyle because of the measures taken during the COVID-19 pandemic, and this may have been an important factor in the physical activity sub-dimension having the lowest score.

In one study, nurses were divided into age groups of 21–30 years, 31–40 years, and 41 years and over, and it was found that those aged 41 and over had a significantly higher HLBS-II total score. The increase in the HLBS-II score average with age is attributed to individuals having more knowledge and experience in the field of health, leading a more regular lifestyle, and giving more importance to their health due to health problems that arise with advancing age (Altay *et al.* 2015). In the present study, the total HLBS-II score of

Table 3. Comparison of individuals' COVID-19 fear scale, adult nutrition knowledge level scale, and healthy lifestyle behaviors scale II total mean scores according to various descriptive characteristics

General characteristics	COVID-19 Fear scale (CFS)		Adult nutrition knowledge level scale (ANKLS)				Healthy lifestyle behaviors scale II (HLBS- II) total	
			Basic nutrition		Nutrition preference			
	Mean±SD	*p*	Mean±SD	*p*	Mean±SD	*p*	Mean±SD	*p*
Gender								
Female	18.21±6.22	Z=-5.350*	54.61±7.87	Z=-0.488*	37.52±6.20	Z=-1.906*	120.08±19.19	t=-1.440***
Male	15.25±5.66	**p<0.001**	53.87±7.43	p=0.626	36.37±6.37	p=0.057	122.57±19.25	p=0.150
Age range								
18–24(1)	16.55±6.28	χ^2=6.306**	52.78±7.81	χ2=19.753**	35.03±6.50	χ^2=24.571**	115.85±18.14	χ^2=27.087**
25–34(2)	17.05±5.98	p=0.177	54.14±7.74	**p=0.001**	37.42±6.50	**p<0.001**	122.14±18.59	**p<0.001**
35–44(3)	17.16±5.90		56.96±6.76	**[3–1,2]**	38.57±4.98	**[1–2,3,4]**	121.83±18.26	[1–2,4,5]
45–54(4)	16.58±6.25		55.89±7.39		38.87±5.27		128.29±22.21	
55–64(5)	20.44±7.57		54.22±7.64		39.33±4.95		133.22±19.79	
Marital status								
Married	16.92±6.37	Z=-0.436*	55.61±7.25	Z=-2.94*	38.86±5.59	Z=-4.939*	124.72±19.04	Z=-3.570*
Single	17.03±6.05	p=0.663	53.53±7.85	**p=0.003**	35.96±6.44	**p<0.001**	118.94±19.06	**p=0.001**
Education								
Middle school	17.37±6.79	χ^2=2.359**	49.26±7.35	χ^2=31.348**	36.74±6.99	χ^2=22.996**	116.07±19.56	χ2=14.251**
Highschool	16.65±6.68	p=0.501	52.53±7.33	**p<0.001**	34.44±6.70	**p<0.001**	117.40±19.88	**p=0.003**
University	16.86±5.98		54.47±7.19	**[4–1,2,3]**	37.48±5.76	**[2–3,4]**	121.09±18.61	**[4–1,2]**
Postgraduate	17.64±6.01		57.28±8.49		38.68±6.45		126.75±19.27	
Employment								
Not working	17.02±6.38	χ^2=0.122**	53.16±7.67	χ^2=15.799**	36.17±6.39	χ^2=14.499**	118.18±19.02	χ^2=10.567**
Public	16.84±5.74	p=0.941	56.14±7.79	**p<0.001**	38.58±6.01	**p=0.001**	125.30±20.86	**p=0.005**
Private	17.09±6.29		54.22±7.29	**[1–2]**	36.84±6.16	**[1–3]**	121.35±16.93	**[1–2]**
Illness								
Yes	18.06±6.36	Z=-1.949*	56.16±7.68	Z=-2.082*	38.26±5.56	Z=-1.835*	124.43±17.36	Z=-2.296*
No	16.71±6.09	p=0.051	53.84±7.63	**p=0.037**	36.74±6.43	p=0.067	120.26±19.63	**p=0.022**
Body mass index								
Underweight	19.00±6.48	χ^2=2.674**	53.43±7.14	χ^2=1.934**	36.46±5.90	χ^2=6.189**	113.21±19.04	F=2.125****
Normal	16.88±5.99	p=0.445	54.01±7.83	p=0.586	36.83±6.42	p=0.103	120.27±18.38	p=0.096
Moderately overweight	16.91±6.38		54.57±6.84		36.92±6.36		125.52±20.15	
Obese	16.67±6.29		55.69±9.46		39.00±5.31		122.86±20.22	

SD: Standard Deviation; *: Mann-Whitney U test; **: Kruskall-Wallis H test; ***: Independent Sample-t Test; ****: ANOVA test p<0.05 was accepted as statistically significant

those in the 55–64 years age group was higher. Those aged 18–24 might have scored lower because in this age range individuals are still pursuing studies, or because of economic factors, irregular lifestyles, and insufficient knowledge and experience.

Although the pandemic has caused adverse changes in individuals' lifestyle behaviors, such as decreased physical activity, insufficient sleep, or poor psychological health (Alothman *et al.* 2021), it has also improved health-related knowledge and attitude (Aksoy *et al.* 2021). In one study, it was figured out that COVID-19 fear had a positive effect on health knowledge and attitude, and that attitude was positively correlated with healthy eating (Aksoy *et al.* 2021). In the present

Table 4. Correlation between individuals' scale scores

Scales		CFS	ANKLS-Basic nutrition	ANKLS-Nutrition preference	HLBS-Health responsibility	HLBS-Physical activity	HLBS-Nutrition	HLBS-Spiritual development	HLBS-Interpersonal relations	HLBS-Stress management
ANKLS-Basic nutrition	r	-0.017								
	p	0.707								
ANKLS-Nutrition preference	r	**0.088**	**0.617**							
	p	**0.048**	**<0.001**							
HLBS-Health responsibility	r	**0.181**	**0.120**	**0.189**						
	p	**<0.001**	**0.007**	**<0.001**						
HLBS-Physical activity	r	-0.058	0.061	0.032	**0.383**					
	p	0.194	0.166	0.468	**<0.001**					
HLBS-Nutrition	r	0.051	**0.205**	**0.136**	**0.422**	**0.354**				
	p	0.255	**<0.001**	**0.002**	**<0.001**	**<0.001**				
HLBS-spiritual development	r	-0.050	**0.145**	**0.151**	**0.437**	**0.335**	**0.322**			
	p	0.261	**0.001**	**0.001**	**<0.001**	**<0.001**	**<0.001**			
HLBS-Interpersonal relations	r	0.048	0.036	**0.139**	**0.497**	**0.279**	**0.298**	**0.590**		
	p	0.279	0.418	**0.002**	**<0.001**	**<0.001**	**<0.001**	**<0.001**		
HLBS-Stress management	r	0.020	**0.112**	**0.187**	**0.427**	**0.454**	**0.381**	**0.577**	**0.502**	
	p	0.651	**0.011**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	
Total HLBS II	r	0.027	**0.164**	**0.196**	**0.722**	**0.650**	**0.612**	**0.772**	**0.733**	**0.755**
	p	0.540	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**

CFS: COVID-19 Fear Scale; ANKLS: Adult Nutrition Knowledge Level Scale; HLBS: Healthy Lifestyle Behaviors Scale

study also, it was found that as COVID-19 fear levels increased, nutrition preference knowledge levels also increased. The reason for the positive correlation between COVID-19 fear and nutrition preference knowledge level might be that people wanted to have a strong immune system and preferred healthy food.

It is predicted that in times of pandemic, the fear which arises may have a negative effect on lifestyle behaviors by increasing levels of stress and worry (Shultz *et al.* 2016). However, it was seen in the present study that the fear which occurred during the pandemic could also motivate positive lifestyle behaviors as in the health responsibility sub-dimension (Harper *et al.* 2021). It was seen in this study that as people's COVID-19 fear levels increased, there was a positive development in their health responsibility behaviors. Existing literature has shown that there is a mixed correlation between fear and health-related behaviors (Pakpour & Griffiths 2020; Demirtaş-Madran 2021). In a study by Harper *et al.* (2021), it was found that fear of COVID-19 increased the perception of risk and led to positive changes in health protection behaviors. Many theories in the literature have shown that fear-based messages lead to positive changes (Demirtaş-Madran 2021). Messages, called "fear appeal" in health communication, are perceived as threatening and stimulating fear. The effectiveness of such messages stems from the tendency to believe in the persuasive power of inducing fear for positive or negative behavior (Pakpour & Griffiths 2020).

In this study, it was found that as people's basic nutrition knowledge levels increased, their health responsibility, nutrition status, spiritual development, stress management, and total HLBS-II score also increased. Also, it was figured out that as the nutrition preference knowledge scores of those participating in the study increased, their general healthy lifestyle behaviors also increased. The conclusions of the present study accord with some studies, which show a weak positive correlation between nutrition knowledge and diet quality (Spronk *et al.* 2014; Koch *et al.* 2021).

In a study by Zaborowicz *et al.* (2016), health-improving behaviors such as not adding sugar to drinks and not putting salt on food were found to be commoner in individuals with high levels of nutrition knowledge. Some studies have shown that having a good level of nutrition knowledge is not always correlated with healthier nutrition habits (Aktaç *et al.* 2018; Suliga *et al.* 2020). In a study conducted on Polish, German, and Slovak students, it was found that Polish students had the highest knowledge levels on the topic of food and nutrition, but this was not reflected in their diet (Suliga *et al.* 2020). These findings show that an increase in nutrition knowledge may not always be reflected in behavior. This is because eating habits are influenced by many factors, including personal factors (biological characteristics and physiological needs, habits and experiences, and psychological components), cognitive factors (knowledge and skills, attitudes, tastes and preferences, expected outcomes, and personal identity), and sociocultural factors (economic variables, culture, and political elements) (Chen & Antonelli 2020). Also, even though significant correlations were observed in the expected direction between nutrition knowledge level and healthy lifestyle behaviors in this study, this correlation was at a weak level. Thus, it is seen that it would not be possible for the rise in nutrition knowledge alone to lead to large changes in nutrition and other health lifestyle behaviors.

This research has some limitations. As the research data were collected online, the participants were limited to those who could use information technologies such as computers or mobile phones. Research data were collected in a self-reported manner and thus became subjective. It was assumed that the validity and reliability of data that could be measured by the researcher, especially body weight and height, were higher. These limitations were a consequence from the threats and restrictions brought by the COVID-19 pandemic.

CONCLUSION

This study found that fear of COVID-19, nutritional knowledge, and healthy lifestyle behaviors were influenced by various socio-demographic characteristics and that there was a relationship between these three items.

The expected positive but weak correlation between nutrition knowledge level and lifestyle behaviors showed that an increase in knowledge level by itself was not enough to cause behavioral changes. Therefore, effective education should be planned, so that individuals may adopt lifestyle behaviors such as healthy eating and physical activity and put knowledge into practice. This education should be arranged so as to meet individuals' needs by taking into account individual, social, and environmental factors.

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DECLARATION OF CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest.

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