

# The Perception of Health and the Change in Nutritional Habits of Healthcare Professionals During the COVID-19 Pandemic

Yağmur Nil Doğan<sup>1</sup>, İlkay Doğan<sup>2</sup>, İbrahim Kiliç<sup>3</sup>

<sup>1</sup>İslahiye Vocational School, Department of Veterinary, Gaziantep University, Gaziantep, Turkey; <sup>2</sup>Faculty of Medicine, Department of Biostatistics, Gaziantep University, Gaziantep, Turkey; <sup>3</sup>Faculty of Veterinary Medicine, Department of Biostatistics, Afyon Kocatepe University, Afyonkarahisar, Turkey.

**Abstract.** *Study Objectives:* The COVID-19 pandemic and the quarantine process affected people's normal lives, nutritional types and habits, activities, and psychological/mental states. Due to the COVID-19 pandemic and restriction decisions, healthcare professionals' workload and working hours have increased. To determine the change in the nutritional habits of healthcare professionals who play the most important role in the COVID-19 pandemic process and their perception of health. *Methods:* Doctors (specialists or practitioners n=193), nurses/midwives (n=147), medical secretaries and paramedics (n=63) working in state hospitals, university hospitals, family medicine centers, or private hospitals before and during the COVID-19 pandemic were included in the study. The perception of health scale and a questionnaire were applied to a totally of 403 participants. Comparisons among the changes in the nutritional habits of healthcare professionals before and during the COVID-19 pandemic were performed using the paired t test for continuous variables, McNemar-Bowker's test for categorical variables. *Results:* It was observed an increase in the working hours in a day of healthcare professionals. The frequency of having breakfast, having lunch, having dinner, and having snacks had decreased. An increase in the consumption of foods that boost the immune system has been observed. While healthcare professionals had unbalanced nutrition, they were aware of the importance of adequate nutrition. *Conclusions:* By reaching the number of healthcare professionals who can work adequately and effectively, the working hours of healthcare professionals can be reduced in the pandemic.

**Key words:** COVID-19, pandemic, nutritional habits, health perception, healthcare professionals

## Introduction

The coronavirus (COVID-19) pandemic firstly emerged at the end of 2019 (December 2019), in Wuhan, Hubei Province, China. The COVID-19 infection caused clusters of onset similar to severe acute respiratory syndrome (SARS) coronavirus (1, 2). Most of the coronaviruses (SARS in 2002 and 2003 in Guangdong, China; the Middle East respiratory syndrome (MERS) coronavirus, emerged in Middle

Eastern countries in 2012) only cause mild respiratory infections, but SARS-CoV-2, a newly identified member of the coronavirus family, started the contagious and lethal COVID-19 in December 2019 (2, 3). The COVID-19 is one more highly pathogenic coronavirus, has raised world concern because of its high transmission capability as well as high mobility and mortality (1, 4). Since the detection of the first case in Wuhan, the COVID-19 pandemic has evolved into a global crisis within only four months and was

announced as a pandemic on 11 March 2020 by The World Health Organization (5). As of July 30, 2021, there are more than 195,000,000 confirmed cases of COVID-19 worldwide, with approximately 4,200,000 related deaths (6). Therefore, it is a difficult time for public health as well as healthcare professionals in this outbreak.

Since COVID-19 has been a disease that has caused a rapid increase in cases and deaths since its first definition, many countries around the world have made some restriction decisions both within own borders and with other countries in March-June 2020, reporting people to lock themselves in their homes and stay in quarantine. In October-December 2020, when the second wave of the pandemic was experienced, some countries around the world reported that they decided to isolate/quarantine. Also, in Turkey, it has been announced another third quarantine in May 2021. A range of public health interventions including traffic restriction, social distancing, home confinement and centralized quarantine, and improvement of medical supplies have enormously contributed to the quick containment of the epidemic in China and set an encouraging example for other countries being affected (7). The reasons why countries decide to quarantine can be stated as reducing the spread rate of the virus, preventing it from spreading, reducing the number of infected people (cases), and improvement of medical supplies. In addition, quarantine decisions are taken to reduce the patient load in hospitals, the density in intensive care units, and the number of inpatients. Therefore, the intense workload, working conditions/hours, stress, and fatigue levels on healthcare professionals can be reduced. However, quarantine and isolation measures urgently adopted to control the pandemic might potentially have negative psychological and social effects especially on those most vulnerable, such as frontline medical workers, children, and older adults (8). The COVID-19 pandemic and the quarantine process affected people's normal lives, nutritional types and habits, activities, and psychological/mental states.

In the literature, it is possible to find many studies emphasizing that the nutritional types and habits of individuals change during the COVID-19 pandemic around the world (9-13). Due to the COVID-19 pandemic and restriction decisions, healthcare

professionals' workload and working hours have increased (14, 15). Consequently, their habitual lifestyle, including food consumption, eating behavior, water intake and stimulant substances consumption, such as caffeine underwent important changes due to stress factors at work, impacting nutritional status, immunity response, sleep, and mental health (16-18). In this study, it was aimed to determine the change in the nutritional habits of healthcare professionals who play the most important role in the COVID-19 pandemic process and their perception of health.

## Materials and Methods

### *Participants*

Doctors (specialists or practitioners), nurses/midwives, medical secretaries and paramedics working in state hospitals, university hospitals, family medicine centers, or private hospitals before and during the COVID-19 pandemic were included in the study. Healthcare professionals from the pharmacy, dentistry, and veterinarians were not included in the study. Employees who work in public hospitals, university hospitals, family medicine centers, or private hospitals as servants, officers, administrators, or pharmacists were not included in the study. The healthcare professionals who were appointed/recruited for the first time during the COVID-19 pandemic were also not included in the study.

### *Sample size*

The population of this research consists of doctors, nurses, midwives, medical secretaries and paramedics working in hospitals (state hospitals, university hospitals, family medicine centers, or private hospitals) operating in Turkey before and during the COVID-19 pandemic. According to the Ministry of Health data of 2019, 160810 doctors, 254075 nurses/midwives, and 182456 other health employers (medical secretaries, paramedics, etc.) work in Turkey (19). In the study, due to time, cost, and distance constraints, the sample was chosen, and the sample was selected using the stratified sampling method according to the job (doctor, nurses/midwives, and other health employers). In

this context, recommended by Özdamar (20) for quantitative research; the sample size calculation formula ( $n = \sigma^2 \cdot Z_a^2 / d^2$ ) was used. Accordingly, the standard deviation ( $\sigma$ ) value was taken as 1,  $Z_a = 1,96$  against the significance level of 0,05, and the effect size ( $d$ ) expressing the sampling error was taken as 0,1, and the sample size was calculated as 384.

### *Data collection*

A questionnaire was used as a data collection technique in the study. In the first part of the questionnaire used in the study, questions to determine the socio-demographic characteristics (gender, age, marital status, living place, job, institution of employment) of healthcare professionals were included. In the second part of the questionnaire, questions (In Table 2 and Table 3) were asked to determine the changes in the nutritional habits of healthcare professionals before and during the COVID-19 pandemic. Participants were asked to score their nutritional habits between 0 (none) and 6 (complete), before and during the COVID-19 pandemic. In the third part of the questionnaire, the Perception of Health Scale (PHS), which was developed by Diamond et al. (21) and validity/reliability analysis in Turkish performed by Kadioğlu and Yıldız (22), was used to determine the health perception of healthcare professionals. The scale is a five-point Likert-type scale consisting of 15 items and four sub-dimensions. Items 1, 5, 9, 10, 11, and 14 are positive attitudes, items 2, 3, 4, 6, 7, 8, 12, 13, and 15 are negative attitudes. Positive attitudes were scored as “strongly agree = 5”, “agree = 4”, “neither agree nor disagree = 3”, “disagree = 2”, “strongly disagree = 1”. Negative attitudes were scored inversely. The sub-dimensions of the scale; the center of control (“Being healthy is largely a matter of good fortune”), the certainly (“I am often confused about what to do to stay healthy”), the importance of health (“I think about my health a lot”), and the self-awareness (“If I exercise and eat right, I’m almost certain to stay healthy”) includes five items (2, 3, 4, 12, 13), four items (6, 7, 8, 15), three items (1, 9, 11) and three items (5, 10, 14), respectively. The reliability coefficient Cronbach Alpha values for the center of control, the certainly, the importance of health, the self-awareness, and the total scale were given 0.705, 0.728, 0.612, 0.710, and 0.653,

respectively. The questionnaire, consisting of 3 parts in total, was applied to healthcare professionals with the help of Google forms (online questionnaire form) because of restrictions in the COVID-19 pandemic. The data collection phase was carried out in February-April 2021. The study was conducted in accordance with the guidelines of the revised Helsinki Declaration and the ethical approval with the protocol number of 2021/37 from the Faculty of Medicine, Gaziantep University.

### *Statistical Analysis*

Data of a total of 403 people meeting the inclusion criteria were analyzed. IBM SPSS 22.0 for windows was used for the statistical analysis. Descriptive statistics like mean and  $\pm$  standard deviation (SD) were given for continuous variables, frequencies and percentages were given for categorical variables. Comparisons among the changes in the nutritional habits of healthcare professionals before and during the COVID-19 pandemic were performed using the paired t test for continuous variables, McNemar-Bowker’s test for categorical variables. In the comparison of the scores obtained from the PHS and sub-dimensions according to some demographic variables, t-test for variables containing two groups and ANOVA for variables containing more than two groups were used. Significance was set at  $p < 0.05$ .

## **Results**

A total of 403 healthcare professionals from 37 provinces of Turkey (approximately 46% of Turkey since Turkey has 81 provinces) participated in the study between February-April 2021. The healthcare professionals’ 35.5% worked in state hospitals, 29.5% in university hospitals, 15.1% in private hospitals, 14.6% in education and research hospitals, and 5.2% in family medicine centers. Of the participants, 47.9% are doctors, 36.5% are nurses/midwives and 15.6% are other health employers. Moreover, 65.0% of the healthcare professionals participating in the study were female and 35.0% were male. The mean age and standard deviation value of the participants were determined as  $37.09 \pm 9.83$  (min: 21, max: 69) (Table 1).

**Table 1.** Some demographic characteristics of the participants

Age (mean±SD)		37.09±9.83 (min:21, max:69)	
		n	%
Gender	Male	141	35.0
	Female	262	65.0
Job	Midwives	18	4.5
	Doctors	193	47.9
	Nurses	129	32.0
	Other health employers	63	15.6
Hospitals	State Hospitals	143	35.5
	University Hospitals	119	29.5
	Private Hospitals	61	15.1
	Family Medicine Centers	21	5.2
	Education and Research Hospitals	59	14.6

The frequency of having breakfast, having lunch, having dinner, having snacks, eating frozen foods, eating canned foods, eating fruits, eating dried fruits, eating nuts, drinking fizzy drinks, drinking tea/coffee,

consuming red meat, consuming beekeeping products, consuming medicinal and aromatic plants, and using additional vitamins/supplements had shown a statistically significant difference before and during the COVID-19 pandemic ( $p < 0.05$ ). The frequency of having breakfast, having lunch, having dinner, having snacks, and drinking fizzy drinks had decreased during the pandemic process for healthcare professionals. The frequency of eating frozen foods, eating canned foods, eating fruits, eating dried fruits, eating nuts, drinking tea/coffee, consuming red meat, consuming beekeeping products, consuming medicinal and aromatic plants, and using additional vitamins had increased during the pandemic process. Additionally, the frequency of eating convenience foods, homemade foods, vegetables, drinking water/mineral water, smoking, consuming white meat, seafood, milk and dairy products, egg, cereals and cereal products, hunting and consume hunting products had not shown statistically significant difference before and during the COVID-19 pandemic ( $p > 0.05$ ) (Table 2).

The number of meals in a day, the mean daily sleep time, the working hours in a day, the hours

**Table 2.** The changes in the nutritional habits of healthcare professionals before and during the COVID-19 pandemic

Questions		Before	During	p
Q1)	How often do you have breakfast?	2.95 ± 2.06	2.8 ± 2.13	<b>0.002*</b>
Q2)	How often do you have lunch?	3.33 ± 1.93	2.92 ± 1.99	<b>0.001*</b>
Q3)	How often do you have dinner?	3.92 ± 1.87	3.73 ± 1.87	<b>0.001*</b>
Q4)	How often do you have snacks?	1.56 ± 1.63	1.26 ± 1.53	<b>0.001*</b>
Q5)	How often do you eat convenience foods (from a restaurant, café or internet orders)?	1.97 ± 1.54	1.91 ± 1.59	0.509
Q6)	How often do you eat frozen foods (fish, pizza, toasts, etc.)?	1.19 ± 1.33	1.44 ± 1.62	<b>0.001*</b>
Q7)	How often do you have canned foods (tuna fish, pickles, beans, etc.)?	1.29 ± 1.28	1.44 ± 1.44	<b>0.001*</b>
Q8)	How often do you eat homemade foods (meals, breads, etc.)?	3.47 ± 1.67	3.45 ± 1.77	0.701
Q9)	How often do you drink water/mineral water?	3.23 ± 1.7	3.28 ± 1.74	0.327
Q10)	How often do you drink fizzy drinks (coke, soda, etc.)?	1.23 ± 1.41	1.14 ± 1.41	<b>0.014*</b>
Q11)	How often do you drink tea or coffee?	3.37 ± 1.69	3.55 ± 1.74	<b>0.001*</b>
Q12)	How often do you smoke?	0.95 ± 1.75	1.00 ± 1.84	0.364
Q13)	How often do you consume red meat (mutton or beef)?	2.8 ± 1.47	2.87 ± 1.56	<b>0.041*</b>
Q14)	How often do you consume white meat (chicken or fowl)?	2.6 ± 1.44	2.6 ± 1.57	0.938
Q15)	How often do you consume seafood?	1.98 ± 1.41	1.97 ± 1.5	0.893
Q16)	How often do you consume milk and dairy product?	2.81 ± 1.67	2.86 ± 1.71	0.141
Q17)	How often do you consume egg?	2.9 ± 1.66	2.96 ± 1.74	0.194

Questions		Before	During	p
Q18)	How often do you consume beekeeping products (honey, pollen, etc.)?	1.79 ± 1.47	1.96 ± 1.63	<b>0.001*</b>
Q19)	How often do you eat fruits?	2.62 ± 1.6	2.79 ± 1.71	<b>0.001*</b>
Q20)	How often do you eat vegetables?	2.91 ± 1.53	2.95 ± 1.61	0.361
Q21)	How often do you consume medicinal and aromatic plants (ginger, turmeric, locust bean, etc.)?	1.32 ± 1.39	1.75 ± 1.72	<b>0.001*</b>
Q22)	How often do you eat dried fruits (figs, Persimmons, apricots, etc.)?	1.93 ± 1.54	2.16 ± 1.68	<b>0.001*</b>
Q23)	How often do you eat nuts (walnuts, hazelnuts, peanuts, etc.)?	2.53 ± 1.51	2.76 ± 1.6	<b>0.001*</b>
Q24)	How often do you consume cereals and cereal products (bread, pita, etc.)?	2.69 ± 1.61	2.72 ± 1.66	0.443
Q25)	How often do you use additional vitamins/supplements (Vitamin C, Vitamin D, etc.)?	1.24 ± 1.44	2.33 ± 1.98	<b>0.001*</b>
Q26)	How often do you hunt and consume hunting products?	0.2 ± 0.65	0.18 ± 0.63	0.068

\*p<0.05

spending on social media in a day, the hours spending on electronics in a day, the hours spending with family in a day was found to be statistically significant before and during the COVID-19 pandemic (p<0.05). Accordingly, a decrease was observed in the number of daily meals, in the mean daily sleep time, and the hours spending with family in a day of healthcare professionals. Conversely, an increase was observed in the working hours, in the hours spending on social media, and in the hours spending on electronics of healthcare professionals (Table 3).

While the mean of the PHS score for healthcare professionals was determined as 3.48±0.46, the mean of the center of control sub-dimension was 3.59±0.75; the mean of the certainly sub-dimension was 3.6±0.85; the mean of the importance of health sub-dimension was 3.2±0.79 and the mean of the self-awareness sub-dimension was 3.4±0.79. Statistically significant difference was determined between the center of control, the certainly, the importance of health, and the PHS scores according to the job (p<0.05). On the other hand, no statistically significant difference was found in the sub-dimension of self-awareness according to the job (p>0.05). While the scores of the doctors regarding the center of control and the certainty sub-dimensions were higher than the other groups, the score of the doctors in the importance of health sub-dimension was lower than the other groups. When the PHS score was taken into account, the scores of doctors were higher than other groups (Table 4).

Statistically significant difference was determined between the center of control, the certainly, and the PHS scores according to gender (p<0.05). On the other hand, no statistically significant difference was found in the sub-dimension of the importance of health, and self-awareness according to gender (p>0.05). The scores of the male regarding the center of control, the certainty sub-dimensions, and the PHS were higher than the female (Table 5).

There was a very poor, positive, and statistically significant relation between the PHS and the questions with Q1 (How often do you have breakfast?), Q2 (How often do you have lunch?), Q3 (How often do you have dinner?), Q8 (How often do you eat home-made foods?), Q9 (How often do you drink water/mineral water?), Q13 (How often do you consume red meat?), Q15 (How often do you consume seafood?), Q16 (How often do you consume milk and dairy product?), and Q17 (How often do you consume egg?) (Table 6).

## Discussion and Conclusion

It was aimed to determine the change in the nutritional habits of healthcare professionals who play the most important role in the COVID-19 pandemic process and their perception of health. It is a well-known fact all over the world that healthcare professionals have been working very intensely and devotedly

**Table 3.** The changes in the social life of healthcare professionals before and during the COVID-19 pandemic

How many meals do you have in a day?		Before the pandemic			Total	p
		2 or less	3	4 or more		
During the pandemic	2 or less	90 (84.9)	53 (20.9)	11 (25.0)	154 (38.2)	0.001*
	3	15 (14.2)	173 (68.4)	8 (18.2)	196 (48.6)	
	4 or more	1 (0.9)	27 (10.7)	25 (56.8)	53 (13.2)	
Total	106 (100.0)	253 (100.0)	44 (100.0)	403 (100.0)		
What is your mean daily sleep time (hours)?		6 or less	6-8	8 or more	Total	
During the pandemic	6 or less	55 (78.6)	64 (21.1)	8 (26.7)	127 (31.5)	0.001*
	6-8	14 (20.0)	217 (71.6)	12 (40.0)	243 (60.3)	
	8 or more	1 (1.4)	22 (7.3)	10 (33.3)	33 (8.2)	
Total	70 (100.0)	303 (100)	30 (100.0)	403 (100.0)		
How many hours do you work in a day?		8 or less	8-16	16 or more	Total	
During the pandemic	8 or less	25 (52.1)	13 (4.2)	0 (0.0)	38 (9.4)	0.001*
	8-16	19 (39.6)	248 (80.5)	3 (6.4)	270 (67.0)	
	16 or more	4 (8.3)	47 (15.3)	44 (93.6)	95 (23.6)	
Total	48 (100.0)	308 (100)	47 (100.0)	403 (100.0)		
How many hours do you spend on social media (twitter, Facebook, Instagram) in a day?		2 or less	2-4	4 or more	Total	
During the pandemic	2 or less	147 (70.3)	19 (12.2)	8 (21.1)	174 (43.2)	0.001*
	2-4	55 (26.3)	92 (59.0)	7 (18.4)	154 (38.2)	
	4 or more	7 (3.3)	45 (28.8)	23 (60.5)	75 (18.6)	
Total	209 (100.0)	156 (100)	38 (100.0)	403 (100.0)		
How many hours do you spend on electronics (TV, telephone, computer, tablet) in a day?		1 or less	1-3	3 or more	Total	
During the pandemic 1-3 3 or more	1 or less	57 (68.7)	21 (8.9)	4 (4.8)	82 (20.3)	0.001*
	18 (21.7)	159 (67.4)	5 (6.0)	182 (45.2)		
	8 (9.6)	56 (23.7)	75 (89.3)	139 (34.5)		
Total	83 (100.0)	236 (100)	84 (100.0)	403 (100.0)		
How many hours do you spend with your family in a day?		1 or less	1-3	3 or more	Total	
During the pandemic 1-3 3 or more	1 or less	33 (68.8)	21 (11.1)	28 (17.0)	82 (20.3)	0.001*
	12 (25.0)	140 (73.7)	30 (18.2)	182 (45.2)		
	3 (6.3)	29 (15.3)	107 (64.8)	139 (34.5)		
Total	48 (100.0)	190 (100)	165 (100.0)	403 (100.0)		

\*p&lt;0.05

since the day COVID-19 was first identified (14, 23, 24). The result of this study had shown again that the daily working hours of healthcare professionals had increased. Furthermore, Wang et al. (14) reported that pressure of treatment, work intensity, and lack of rest indirectly increased the probability of infection for

healthcare professionals. According to Barquehais et al. (15), healthcare professionals with higher clinical responsibilities were at a higher risk for psychological distress. Therefore, the depression, anxiety, and stress levels of healthcare professional's increased (25-27). It had been observed that the hours spending on social

**Table 4.** Comparison of the PHS score and sub-dimensions scores according to job

		N	Mean±SD	p
The Center of Control	Nurses/Midwives	147	3.40 ± 0.85 <sup>b</sup>	<b>0.001*</b>
	Doctors	192	3.72 ± 0.67 <sup>a</sup>	
	Other health employers	63	3.59 ± 0.66 <sup>ab</sup>	
The Certainly	Nurses/Midwives	147	3.39 ± 0.87 <sup>b</sup>	<b>0.001*</b>
	Doctors	193	3.78 ± 0.80 <sup>a</sup>	
	Other health employers	63	3.53 ± 0.84 <sup>ab</sup>	
The Importance of Health	Nurses/Midwives	147	3.30 ± 0.79 <sup>a</sup>	<b>0.023*</b>
	Doctors	192	3.09 ± 0.73 <sup>b</sup>	
	Other health employers	63	3.31 ± 0.93 <sup>a</sup>	
The Self-awareness	Nurses/Midwives	147	3.43 ± 0.83	0.769
	Doctors	192	3.37 ± 0.72	
	Other health employers	63	3.39 ± 0.91	
The PHS	Nurses/Midwives	147	3.39 ± 0.5 <sup>b</sup>	<b>0.006*</b>
	Doctors	193	3.55 ± 0.42 <sup>a</sup>	
	Other health employers	63	3.48 ± 0.43 <sup>ab</sup>	

\*p&lt;0.05

**Table 5.** Comparison of the PHS score and sub-dimensions scores according to gender

		N	Mean±SD	p
The Center of Control	Male	147	3.75 ± 0.67	<b>0.001*</b>
	Female	192	3.50 ± 0.78	
The Certainly	Male	147	3.71 ± 0.76	<b>0.034*</b>
	Female	193	3.53 ± 0.89	
The Importance of Health	Male	147	3.22 ± 0.81	0.688
	Female	192	3.19 ± 0.78	
The Self-awareness	Male	147	3.48 ± 0.80	0.111
	Female	192	3.35 ± 0.78	
The PHS	Male	147	3.59 ± 0.40	<b>0.001*</b>
	Female	193	3.42 ± 0.47	

\*p&lt;0.05

**Table 6.** The correlation between the PHS and the questions of nutritional habits

		Q1	Q2	Q3	Q8	Q9	Q13	Q15	Q16	Q17
The PHS	r	0.157	0.124	0.131	0.161	0.175	0.153	0.158	0.132	0.141
	p	0.002*	0.013*	0.008*	0.001*	0.001*	0.002*	0.001*	0.008*	0.004*
	N	403	403	403	403	403	403	403	403	403

\*p&lt;0.05

media and the hours spending on electronics had increased due to the increase in working hours. It was thought that social media usage may have increased to follow the news and the situation about COVID-19 in the world and the quarantine decisions (rules, conditions) taken by countries through social media. In addition, social media could be a way to relax a little under these work intensity conditions. The use of electronics may have increased due to the same reasons. In addition, it may have been used in communication with the family under intense working conditions. There had been a decrease in the number of daily meals, in the mean daily sleep time and the hours spending with family by the increase in working hours.

When the nutritional habits of healthcare professionals before/during the pandemic were examined the frequency of having breakfast, having lunch, having dinner, and having snacks had decreased by the increase in working hours, and work intensity. Accordingly, an increase in eating frozen foods, eating canned foods, and drinking tea/coffee was observed indirectly. While the frequency of eating fruits, eating dried fruits, eating nuts, consuming red meat, consuming beekeeping products, consuming medicinal and aromatic plants, and using additional vitamins had decreased during the pandemic process, drinking fizzy drinks had decreased for healthcare professionals. As Maffoni et al. (16) emphasized that adequate and balanced nutrition not only supports the psychological health of health workers in the work environment but also supports them in the fight against COVID-19. Nuts and dried fruits have been part of the human diet since they are nutrient-rich foods and constitute an excellent means to deliver health-promoting bioactive compounds. As such, they serve as important healthful snack items, besides being part of many traditional and new recipes of gastronomy worldwide (28). Angelidi et al. (29) suggested not only consuming plant-derived nutritional components (such as fruits, nuts, vegetables legumes and olive oil) for their directly preventive effect of cardiovascular diseases and type-2 diabetes but also indirectly preventive effect against COVID-19. Al Nagggar et al. (30) emphasized the honeybees products were well known for their nutritional and medicinal value and had been used for various therapeutic purposes especially bee pharmacy against

COVID-19 either by direct antiviral effects of their bioactive peroxides, peptides, flavonoids, and phenolics or indirect effects due to their immunomodulatory effect on the host immune system and interfering with host inflammatory response aroused by COVID-19. Healthy and balanced nutrition has gained importance during quarantine. People needed to consume healthy foods containing a high amount of minerals, antioxidants, and vitamins. Fruits and vegetables have been supplied micronutrients that can boost immune function. This happens because some of these micronutrients such as vitamin E, vitamin C, and beta-carotene are antioxidants (31). During quarantine, the public has spent less time outdoors. Thus, they could be associated with less sun exposure, and reduced production of vitamin D. Vitamin D deficiency is related to viral epidemics especially in winter. Intake adequate vitamin D reduces the risk of developing several chronic diseases such as cancers, cardiovascular disease, diabetes mellitus, and hypertension (32). Vitamin D, which could not be obtained through the sun-exposure, began to be met through diet. Foods containing vitamin D include fish, liver, egg yolk. Another essential trace element is zinc which is essential for the maintenance of immune function. It has been reported that zinc inhibited severe acute respiratory syndrome (SARS) coronavirus (33). The most common foods to get zinc are represented by poultry, red meat, nuts, pumpkin seeds, sesame seeds, beans, and lentils. All of these foods are related to vitamins and trace elements which are effective on the immune system (34). Diets should have vitamins and antioxidants for disease prevention, especially seasonal colds. Key dietary components, such as vitamins C, D, E, zinc, selenium, and polyunsaturated fatty acids, have a regulatory effect on the immune system. Khodadadi et al. (35) and Shakoore et al. (36) have shown that dietary supplements can be effective on the viral load of SARS-CoV-2 and could be accelerated the recovery period in patients with COVID-19.

Interest in medicinal plants has started to increase because of its chemicals which have a physiological effect and pharmacological activity on human body organs and animal body. Medical plants include active substances for curative activity on many diseases. Moreover, they have not any side effects (37). In addition to medical plants, herbs are used in many therapeutic



practices. Using it has been aimed at boosting immunity for the disease. Phytotherapy is using to cope with infectious diseases (38). Extracts from medicinal plants have an inhibitory effect on viruses such as herpes simplex virus type 2, HIV, hepatitis B virus (HBV), smallpox virus, and severe acute respiratory syndrome, as well as on viral strains resistant to conventional antiviral drugs (39). Many alternative medicine specialists have given their opinion on medicinal plants and herbs (Allium, Lemon, Garlic, Orange, etc.) explaining that "nature has always been the owner of magic solves when human minds fail" (40). Recently, the researches of alternative medicine have been started to increase because boosting the immune system. Antiviral and immunomodulatory activities of medicinal plants and herbs have been proven. A balanced diet and dietary intake of nutrients affect the immune system through gene expression, cell activation, and modification of signaling molecules. In addition, various food ingredients are determinants of the gut microbial composition and subsequently form immune responses in the body (41, 42). Thus, prevention of disease has been understood with alternative medicine. For all of these reasons, people have been discovered to the importance of medicinal plants and herbs and started to tend to consume more than before the pandemic. It is thought that people are looking for natural solutions against the COVID-19, whose treatment is not known exactly or effectively as the reason for the increase in the consumption of medicinal and aromatic plants. This situation showed that healthcare professionals were aware that they should pay attention to their nutrition and health during the COVID-19 pandemic despite the deterioration of some nutritional habits.

When the results of the health perception scale were evaluated according to job, the center of control, the certainly, and the PHS scores of the doctors were higher than nurses/midwives. On the contrary, the importance of health scores of the doctors was lower than nurses/midwives. This could be interpreted as doctors had more controlling and certain information about their health and therefore thought less about their health. Also, participants had the same level of self-awareness according to the job. When the results of the health perception scale were evaluated according to gender, the center of control, the certainly, and the

PHS scores of the male were higher than the female. This could be interpreted as the males had more control and certain information about their health. Also, participants had the same level of self-awareness and the importance of health according to gender.

There was a very poor, positive, and statistically significant relation between the PHS and the frequency of having breakfast, having lunch, having dinner, eating homemade foods, drinking water/mineral water, consuming red meat, consuming seafood, consuming milk and dairy product, and consuming egg. With this result, it was thought that healthcare professionals are aware of the role of balanced and adequate nutrition in preventing diseases. Malnutrition is currently largely diffuse, leading to an impaired resistance to infections and, consequently, to an increase in disease seriousness. Nutrition is pivotal in supporting the immune system. Immune homeostasis is indeed well-regulated by balanced nutrition. An adequate nutrition regimen is key in the defense against viral threats (43). It is known that malnutrition and undernutrition cause more severe diseases. Likewise, it is reported that individuals with Malnutrition, undernutrition, and micronutrient deficiency cannot overcome COVID-19 easily (44, 45). In addition to adequate and balanced nutrition, the pandemic has led us to the consumption of home food, which is thought to be healthier because people make the supply of the ingredients themselves and know how they are prepared. Consumption of milk and dairy products can prevent chronic diseases such as cardiovascular diseases, stroke, type 2 diabetes mellitus, metabolic syndrome, obesity, osteoporosis, and certain types of cancer (46). Kweon (47) has concluded that milk is necessary for balanced nutrition and child growth since milk contains essential nutrients, including calcium. Park et al. (46) has revealed that health perceptions of consumers are positive in Korea and other countries about milk. It had concluded that in Slovenia, higher levels of COVID-19 risk perception were associated with a decrease in the consumption of fresh meat, while lower levels of COVID-19 risk perception had a significant effect on the probability of increasing bread consumption. In Germany, people were more likely to increase their consumption of ready-made meals, canned food, and cake and biscuits, and decrease their consumption of fish and

dairy products. In Slovenia, people were more likely to increase their consumption of ready-made meals and frozen food, while the consumption of fresh meat was more likely to decrease (48). Increased fish consumption has positive health benefits via supplementary nutrients. In addition, fish is traditionally considered a healthy diet and pure food (49) Kashem et al. (50) has concluded that %72.8 of participants prefer to consume more fish during the pandemic.

Consequently, it was determined that the daily working hours of healthcare professionals had increased. Accordingly, the frequency of having breakfast, having lunch, having dinner, having snacks, and drinking fizzy drinks had decreased during the pandemic process. It had been proved that healthcare professionals had unbalanced nutrition. On the other hand, the frequency of eating fruits, eating dried fruits, eating nuts, consuming red meat, consuming beekeeping products, consuming medicinal and aromatic plants, and using additional vitamins had increased during the pandemic process. It had been proved that healthcare professionals had adequate nutrition. Healthcare professionals were aware of the importance of adequate nutrition. By reaching the number of healthcare professionals who can work adequately and effectively, the working hours of healthcare professionals can be reduced in the pandemic. Therefore, balanced and adequate nutrition of healthcare professionals can be provided. Moreover, the daily sleep time and time spending with family can be increased by ensuring an adequate number of healthcare professionals. Thus, the anxiety, depression, and stress levels of healthcare professionals may also change. While everyone's mental problems, anxiety, depression, and stress scores have increased during the pandemic period, it is recommended that healthcare professionals should also work specifically.

**Conflict Of Interest:** No potential conflict of interest was reported by the authors.

## References

- Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020; 395(10223): 497-506.
- Zhao D, Yao F, Wang L, et al. A comparative study on the clinical features of coronavirus 2019 (COVID-19) pneumonia with other pneumonias. *Clin Infect Dis*. 2020; 71(15):756-761.
- Hong HG, Li Y. Estimation of time-varying reproduction numbers underlying epidemiological processes: A new statistical tool for the COVID-19 pandemic. *PloS one*. 2020; 15(7): e0236464.
- Cui J, Li F, Shi ZL. Origin and evolution of pathogenic coronaviruses. *Nat Rev Microbiol*. 2019; 17(3):181-192.
- World Health Organization (WHO). Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. Accessed November 12, 2020. <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19-11-march-2020>.
- Worldometers (2021). <https://www.worldometers.info/coronavirus/>. Accessed July 30, 2021.
- Pan A, Liu L, Wang C, et al. Association of public health interventions with the epidemiology of the COVID-19 outbreak in Wuhan, China. *JAMA*. 2020; 323(19):1915-1923.
- Wang Y, Shi L, Que J, et al. The impact of quarantine on mental health status among general population in China during the COVID-19 pandemic. *Mol Psychiatr*. 2021; 1-10.
- Campagnaro R, de Oliveira Collet G, de Andrade MP, et al. COVID-19 pandemic and pediatric dentistry: Fear, eating habits and parent's oral health perceptions. *Child Youth Serv Rev*. 2020; 118:105469.
- Özlem A, Mehmet N. Eating Habits Changes During Covid-19 Pandemic Lockdown. *ESTÜDAM Halk Sağlığı Dergisi*. 2020; 5:188-196.
- Antunes R, Frontini R, Amaro N, et al. Exploring lifestyle habits, physical activity, anxiety and basic psychological needs in a sample of Portuguese adults during COVID-19. *Int J Env Res Pub He*. 2020; 17(12); 4360.
- Di Renzo L, Gualtieri P, Pivari F, et al. Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. *J Transl Med*. 2020; 18: 1-15.
- Sidor A, Rzymiski P. Dietary choices and habits during COVID-19 lockdown: experience from Poland. *Nutrients*. 2020; 12(6): 1657.
- Wang J, Zhou M, Liu F. Reasons for healthcare workers becoming infected with novel coronavirus disease 2019 (COVID-19) in China. *J Hosp Infect*. 2020; 105(1):100-101.
- Braquehais MD, Vargas-Cáceres S, Gómez-Durán E, Nieva G, Valero S, Casas M, Bruguera E. The impact of the COVID-19 pandemic on the mental health of healthcare professionals. *QJM-Int J Med*. 2020; 113(9): 613-617.
- Maffoni SI, Kalmpourtzidou A, Cena H. The potential role of nutrition in mitigating the psychological impact of COVID-19 in healthcare workers. *NFS J*. 2021; 22: 6-8.
- Jahrami H, BaHammam AS, AlGahtani H, et al. The examination of sleep quality for frontline healthcare workers during the outbreak of COVID-19. *Sleep Breath*. 2021; 25(1): 503-511.

18. Ferini-Strambi L, Zucconi M, Casoni F, Salsone M. COVID-19 and sleep in medical staff: reflections, clinical evidences, and perspectives. *Curr Treat Options Neurol*. 2020; 22(10): 1-6.
19. The Ministry of Health (2020). Accessed February 15, 2021. <https://dosyamerkez.saglik.gov.tr/Eklenti/39024,haberbulteni-2019pdf.pdf?0>.
20. Özdamar K. Spss ile Biyoistatistik (9.Baskı), Nisan Kitabevi, Eskişehir, Turkey; 2013.
21. Diamond JJ, Becker JA, Arenson CA, Chambers CV, Rosenthal MP. Development of a scale to measure adults' perceptions of health: Preliminary findings. *J Community Psychol*. 2007; 35(5): 557-561.
22. Kadioglu H, Yildiz A. Sağlık Algisi Ölçeği'nin Türkiye Çevriminin Geçerlilik ve Güvenilirliği. *Türk Klin Tıp Bil*. 2012; 32(1): 47.
23. Shanafelt T, Ripp J, Trockel M. Understanding and addressing sources of anxiety among health care professionals during the COVID-19 pandemic. *JAMA*. 2020; 323(21): 2133-2134.
24. Adams JG, Walls RM. Supporting the health care workforce during the COVID-19 global epidemic. *JAMA*. 2020; 323(15): 1439-1440.
25. Tan BY, Chew NW, Lee GK, et al. Psychological impact of the COVID-19 pandemic on health care workers in Singapore. *Ann Intern Med*. 2020; 173(4): 317-320.
26. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain Behav Immun*. 2020; 88: 901-907.
27. Chew NW, Lee GK, Tan BY, et al. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain Behav Immun*. 2020; 88: 559-565.
28. Alasalvar C, Salvadó JS, Ros E. Bioactives and health benefits of nuts and dried fruits. *Food Chem*. 2020; 314: 126192.
29. Angelidi AM, Kokkinos A, Katechaki E, Ros E, Mantzoros CS. Mediterranean diet as a nutritional approach for COVID-19. *Metab Clin Exp*. 2021; 114: 154407.
30. Al Naggari Y, Yahya G, Al-Kahtani S, Stangaciu S. Back to Ancient Remedy: Could Inhalation of Aerosolised-Honey and Propolis Tincture Protect Against the COVID-19 Pandemic?. *J Apither*. 2021; 8(2):1-5.
31. Chandra RK. Effect of vitamin and trace-element supplementation on immune responses and infection in elderly subjects. *Lancet*. 1992; 340:1124-1127.
32. Muscogiuri G, Altieri B, Annweiler C, et al. Vitamin D and chronic diseases: the current state of the art. *Arch Toxicol*. 2017; 91:97-107.
33. te Velthuis AJ, van den Worm SH, Sims AC, Baric RS, Snijder EJ, van Hemert MJ. Zn(2+) inhibits coronavirus and arterivirus RNA polymerase activity in vitro and zinc ionophores block the replication of these viruses in cell culture. *PLoS Pathog*. 2010; 6: e1001176.
34. Muscogiuri G, Barrea L, Savastano S, Colao A. Nutritional recommendations for COVID-19 quarantine. *Eur J Clin Nutr*. 2020; 74:850-851.
35. Khodadadi E, Maroufi P, Khodadadi E, Esposito I, Ganbarov K, Esposito S, Yousefi M, Zeinalzade E, Kafil HS. Study of combining virtual screening and antiviral treatments of the Sars-CoV-2 (Covid-19). *Microb Pathog*. 2020; 146: 104241.
36. Shakoor H, JackFeehan J, Al Dhaheri AS, Alia HI, Platat C, CheikhIsmail L, Apostolopoulos V, Stojanovska L. Immune-boosting role of vitamins D, C, E, zinc, selenium and omega-3 fatty acids: Could they help against COVID-19? *Maturitas*. 2020; 143:1-9.
37. Abbas MM, Younis KM, Hussain WS. Impact of medicinal plants on corona pandemic. *Plant Cell Biotechnol Mol Biol*. 2021; 62-72.
38. Zhang DH, Wu KL, Zhang X, Deng SQ, Peng B. In silico screening of Chinese herbal medicines with the potential to directly inhibit 2019 novel coronavirus. *J Integr Med*. 2020; 18: 152-158.
39. Lubbe A, Verpoorte R. Cultivation of medicinal and aromatic plants for specialty industrial materials. *Ind Crops Prod*. 2011; 34: 785-801.
40. Li G, Fan Y, Lai Y, et al. Coronavirus infections and immune responses. *J Med Virol*. 2020; 92(4):424-432.
41. Aman F, Masood S. How Nutrition can help to fight against COVID-19 Pandemic. *Pak J Med Sci*. 2020; 36: COVID19-S4.
42. Panyod S, Ho CT, Sheena LY. Dietary therapy and herbal medicine for COVID-19 prevention: A review and perspective. *J Tradit Complement Med*. 2020; 10: 420-427.
43. Calder PC, Carr AC, Gombart AF, Eggersdorfer M. Optimal Nutritional Status for a Well-Functioning Immune System Is an Important Factor to Protect against Viral Infections. *Nutrients*. 2020; 12: 1181.
44. Barazzoni R, Bischoff SC, Breda J, Wickramasinghe K, Krznaric Z, Nitzan D, Pirlich M, Singer P. ESPEN expert statements and practical guidance for nutritional management of individuals with SARS-CoV-2 infection. *Clin Nutr*. 2020; 39: 1631-1638.
45. Fedele D, De Francesco A, Riso S, Collo A. Obesity, malnutrition, and trace element deficiency in the coronavirus disease (COVID-19) pandemic: An overview. *Nutrition*. 2021; 81: 111016.
46. Park J, Lee HS, Lee C, Lee HJ. Milk consumption patterns and perceptions in Korean adolescents, adults, and the elderly. *Int Dairy J*. 2019; 95:78-85.
47. Kweon S. Intakes of calcium and dairy products in Korea national health and nutrition examination survey. *Public Health Wkly Rep*. 2013; 6: 821-840.
48. Janssen M, Chang BP, Hristov H, Pravst I, Profeta A, Milard J. Changes in food consumption during the COVID-19 pandemic: analysis of consumer survey data from the first lockdown period in Denmark, Germany, and Slovenia. *Front Nutr*. 2021; 8: 60.

49. Reis L, Hibbeln R. Cultural symbolism of fish and the psychotropic properties of omega-3 fatty acids. *Prostaglandins Leukot Essent Fatty Acids*. 2006; 75: 227-36.
50. Kashem M, Tasnim N, Rahman M, Bapary MAJ, Akanda M. Consumer's attitudes toward fish consumption during pandemic Covid-19 in Bangladesh. *Int J Nat Sci*. 2021; 11(1):15-22.

---

**Correspondence:**

İlkay DOĞAN, Faculty of Medicine,  
Department of Biostatistics, Gaziantep University,  
Gaziantep, Turkey.  
Email: ilkay\_dgn58@hotmail.com