

# Evaluation of Knowledge, Practices, and Attitudes Towards Coronavirus in Individuals Aged 20-64 Years

## 20-64 Yaş Arası Bireylerde Koronavirüs Hakkında Bilgi, Davranış ve Tutumunun Değerlendirilmesi

● Beray Gelmez Taş<sup>1</sup>, ● Hatice Rümeysa Selvi<sup>2</sup>, ● Güzin Zeren Öztürk<sup>1</sup>, ● Seçil Günher Arıca<sup>2</sup>, ● Memet Taşkın Eğici<sup>3</sup>

<sup>1</sup>University of Health Sciences Turkey, Şişli Hamidiye Etfal Training and Research Hospital, Clinic of Family Medicine, İstanbul, Turkey

<sup>2</sup>University of Health Sciences Turkey, Prof. Dr. Cemil Taşcıoğlu City Hospital, Clinic of Family Medicine, İstanbul, Turkey

<sup>3</sup>University of Health Sciences Turkey, İstanbul Haydarpaşa Numune Training and Research Hospital, Clinic of Family Medicine, İstanbul, Turkey

### ABSTRACT

**Background:** This study was conducted to evaluate the knowledge, attitudes and practices of individuals aged 20-64 about Coronavirus disease-2019 (COVID-19).

**Materials and Methods:** In this study, an online questionnaire was applied to individuals between the ages of 20-64 registered at the Training Family Health Centre of the Okmeydanı Health Practices and Research Centre between 4-8 May 2020 through a phone application. The number of individuals between the ages of 20-64 years in these centres was 12.500, and the survey was sent to every person who owned a phone. One thousand one hundred thirty-eight surveys were included in the study. The confidence interval of our study was 1.96. The online questionnaire form consists of two parts: The first part includes the information form that assesses the socio-demographic data and the practice of personal protection and precautions, and the second part includes questions about knowledge, attitudes, and practices towards COVID-19.

**Results:** One thousand one hundred thirty-eight individuals participated in this study. The average age of the participants was 37.79 [standard deviation (SD): 9.68, minimum: 20, maximum: 64]. The average COVID-19 knowledge score was 10.26 (SD: 1.44, range 0-12). This value shows that in general, the participants correctly answered a proportion of 85.5% (10.26/12\*100). Based on the multiple linear regression analysis, the female gender (compared to men  $\beta$ :-0.268,  $p$ =0.030), individuals with high school or higher education (compared to lower than high school,  $\beta$ : 0.479,  $p$ =0.008) and white-collar workers (compared to retired/not working  $\beta$ :-0.141,  $p$ =0.010), and those with an income of 4500 TL and higher (compared to 2.300 and lower  $\beta$ : 0.143,  $p$ =0.039) had statistically significantly high knowledge scores

**Conclusion:** Generally, the participants had a high level of knowledge of COVID-19. In particular, women, those with high educational levels, members of a white-collar profession group and those with high-income levels were more knowledgeable.

**Keywords:** COVID-19, knowledge, attitude

### ÖZ

**Amaç:** Bu çalışma, 20-64 yaş arasındaki bireylerin Koronavirüs hastalığı-2019 (COVID-19) ile ilgili bilgi, tutum ve uygulamalarını değerlendirmek amacıyla yapılmıştır.

**Gereç ve Yöntemler:** Çalışma 4-8 Mayıs 2020 tarihleri arasında Okmeydanı Sağlık Uygulama Araştırma Merkezi Aile Hekimliği Kliniği'ne bağlı Eğitim Aile Sağlığı Merkezi'ne bağlı nüfustan 20-64 yaş arası bireylere telefon uygulaması üzerinden Google anket uygulanmıştır. Birey sayısı 12,500 olup; telefonu olan her bireye anket gönderilmiştir. Bün yüz otuz sekiz anket çalışmaya alınmıştır. Çalışmamızın güven aralığı 1,96'dır. Olgu rapor formumuz iki bölümden oluşmaktadır; İlk bölüm sosyo-demografik veriler ile kişisel korunma ve tedbirleri uygulama durumlarının değerlendirildiği bilgi formunu; ikinci bölüm ise COVID-19 ile ilgili bilgi, tutum ve davranış değerlendirme anketi sorularından oluşmaktadır.



**Address for Correspondence:** Beray Gelmez Taş, University of Health Sciences Turkey, Şişli Hamidiye Etfal Training and Research Hospital, Clinic of Family Medicine, İstanbul, Turkey

Phone: +90 505 315 02 24 E-mail: drberaygelmez@hotmail.com **ORCID ID:** orcid.org/0000-0002-7126-0024

**Received:** 17.08.2021 **Accepted:** 17.12.2021

**Bulgular:** Çalışmanın örneklemini 1,138 katılımcı oluşturmaktadır. Katılımcıların genel yaş ortalaması 37,79 [standart sapma (SS): 9,68, minimum: 20, maksimum: 64], %64,6'sı (n=735) kadın idi. ortalama COVID-19 bilgi skoru 10,26'dır (SS: 1,44, aralık 0-12). Bu değer genel olarak katılımcıların testi %85,5 (10,26/12\*100) oranında doğru cevapladıklarını göstermektedir. Çoklu doğrusal regresyon analizine göre; kadın cinsiyetin (erkeklere göre  $\beta$ :-0,268,  $p=0,030$ ); lise ve üstü eğitilmiş bireyler (lise ve altına göre,  $\beta$ : 0,479,  $p=0,008$ ); beyaz yakalı çalışanlar (emekli/çalışmıyor göre  $\beta$ :-0,141,  $p=0,010$ ); gelir durumu 4500 TL ve üstü olanlar (2300 TL ve altına göre  $\beta$ : 0,143,  $p=0,039$ ) yüksek bilgi skorlarına sahip olup; istatistiksel olarak anlamlı idi.

**Sonuç:** Genel olarak, araştırmamıza katılanlar COVID-19 hakkındaki bilgi düzeyi yüksek olduğu görüldü. Özellikle kadınlar, eğitim seviyesi yüksek, beyaz yakalı meslek gruplarına mensup olanlar ile gelir seviyesi yüksek olanlar daha bilgili idi.

**Anahtar Kelimeler:** COVID-19, bilgi, tutum

## Introduction

Coronavirus was first detected in 1965 by Tyrrell and Bynoe in a patient with a cold. It was then found that the hepatitis virus in mice and the gastroenteritis virus in pigs had the same morphology (1). Coronavirus has caused two epidemics in the last two decades: Severe acute respiratory syndrome and Middle East respiratory syndrome (2,3).

A series of new virus cases that caused respiratory infections were observed in humans after visiting the wild animal market in December 2019 in China (4). A new coronavirus was detected on January 7, 2020, and the disease it causes was named Coronavirus disease-2019 (COVID-19). The World Health Organization (WHO) declared the COVID-19 pandemic on March 11, 2020. (5). The first COVID-19 case in Turkey was detected on March 10, 2020. (6).

Currently, there is no treatment proven to be effective against COVID-19 infections (7). This situation has led to the prioritization of efforts in preventing transmission. COVID-19 infection is transmitted to humans by contact and droplets (8). It is predicted that the contagion begins 1-2 days before the patient's symptoms begin and ends with their disappearance (5). The transmission rate has varied between 1-5% in the studies performed (9). In our country, many precautions have been taken to prevent transmission and one of these is the curfew in place for individuals 20 years and younger and those 65 years and older (10,11).

The COVID-19 knowledge, attitudes and the behavior of individuals aged 20-64 who have outside contact are important for managing the relationship between home and society.

In our study, it was aimed to evaluate the knowledge, attitudes and practices of individuals aged 20-64 about COVID-19 and the factors affecting them.

## Material and Methods

In this study, an online questionnaire was applied to individuals between the ages of 20-64 registered at the

Training Family Health Centre (TRFHC) of the Okmeydanı Health Practices and Research Centre (Okmeydanı HPRC) between 4-8 May 2020 through a phone application. An online survey was applied to reduce contact during the pandemic. A voluntary consent form was added to the questionnaire and those who were approved were included in the study. The number of individuals between the ages of 20-64 years in the TRFHC of the Okmeydanı HPRC was 12.500, and the survey was sent to every person who owned a phone. One thousand one hundred thirty-eight surveys were included in the study. The confidence interval (CI) of our study was 1.96.

Approval for the study was obtained from University of Health Sciences Turkey, Prof. Dr. Cemil Taşcıoğlu City Hospital HPRC Ethics Committee with the decision numbered 129 on 28.04.2020.

The online questionnaire form consists of two parts: The first part includes the information form that assesses the socio-demographic data and the practice of personal protection and precautions, and the second part includes questions about knowledge, practices and attitudes regarding COVID-19 contained in the survey created by Zhong et al. (12). The permission for use of the survey was received from Yi Li et al. MD, PhD who working Wuhan Mental Health Center on 11.04.2020 by e-mail. Subsequently, we translated it to Turkish.

The survey developed by Zhong et al. (12) consists of 16 questions in total. The first part contains 12 statements, 4 of which question (K1-K4) the clinical symptoms, 3 (K5-K7) question the transmission modes and 5 (K8-K12) inquire about precaution and control. Except for the statements K6 and K9, the other statements of the survey contain accurate information. Scoring is based on knowing whether the statement is correct, and each correct answer score 1 point. If the answer is incorrect or unknown, the score is 0. It was accepted that the total knowledge score was minimum 0, maximum 12, and as the score increased, the knowledge level increased. The Cronbach's alpha value of the information part of the questionnaire comprising 12 questions was calculated as 0.76. Since this value was

higher than 0.5 recommended by Cronbach and Helmstater and 0.7 recommended by Bowling and Ebrahim (13,14), it can be concluded that the survey prepared is reliable.

In the continuation of the questionnaire in our study, one question was added to the questions in both the attitude and practices questions of Zhong et al.'s (12) questionnaire (A3 and P3). Thus, the attitudes related to COVID-19 were evaluated by 3 questions (A1, A2, A3) and the practices were evaluated by 3 questions (P1, P2, P3).

### Statistical Analysis

The data were categorized categorically and individually. The numerical data were presented as mean and standard deviation and the categorical data as median and percentages. The t-tests were used to compare the numerical data and the chi-square tests were used to compare the categorical data. Various attitudes and practices were defined by the frequency of correct knowledge answers. The multivariate linear regression analysis, which uses all demographic variables as independent variables and the knowledge score as the result variable, was carried out to identify the factors related to knowledge. Similarly, binary logistic regression analyses were used to identify the factors associated with attitudes and practices. The factors were selected by a backward stepwise method. The non-standardized regression coefficients ( $\beta$ ), the odds ratios (OR) and the 95% CIs were used to assess the relationships between the variables and knowledge, attitudes, and practices. P-value was determined as 0.05 and the SPSS 21 software was used for statistical analysis.

### Results

One thousand one hundred thirty-eight individuals participated in this study. The mean age of the participants was 37.79 [standard deviation (SD): 9.68, min: 20, max: 64]; 64.6% (n=735) were women, 93.4% (n=1063) had educational levels of high school and higher, 64.0% (n=728) were married, 72.0% (n=819) were white-collar workers and 56.8% (n=646) had an income of 4500 TL and higher.

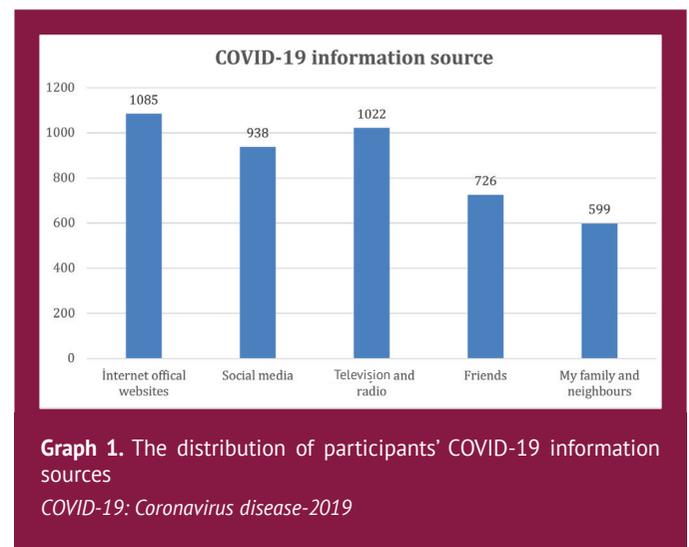
Reviewing the distribution of answers given to the question "Do you believe that you have sufficient knowledge about COVID-19?" showed that 63.6% (n=923) stated that they had sufficient knowledge, 2.6% (n=30) stated that they had insufficient knowledge and 33.7% (n=384) stated that they had partial knowledge about COVID-19. When we looked at the distribution of multiple-choice answers to the question "What is/are your information resource or resources about COVID-19?", it was identified that 24.8% (n=1.085) used official web sites (Ministry of Health of Turkey, WHO, Centres for Disease Control, etc.) as their information source (Graph 1). These were followed by visual and social media.

32.5% (n=370) answered yes to the question, "Do you know anyone who is suffering/has suffered from COVID-19?" Of the participants, 23.8% (n=271) stated that they wanted to have a COVID-19 test to the question, "Did you want to have a COVID-19 test because you were worried despite not having any complaints?"

### Assessment of Personal Protection and Precautionary Practices

The participants were asked about their practices of personal protection and precautions in compared to the time before COVID-19. It was identified that the practice of "frequent ventilation of the environment" increased in 81.1% (n=923), decreased in 0.6% (n=7), and had not changed in %28.3% (n=208). The practice of "cleaning surfaces you frequently use with water and detergent frequently" increased in 77.1% (n=877), decreased in 0.8% (n=9), and had not changed in 21.1% (n=252). It was identified that the practice of "sharing personal belongings such as towels" increased in 23.2% (n=264), decreased in 45.2% (n=514), and had not changed in 31.6% (n=360).

The practice of "washing clothes at high temperatures" increased in 51.1% (n=581), decreased in 2.2% (n=25), and had not changed in 46.7% (n=532). The practice of "refraining from close contacts such as shaking hands and hugging" increased in 62.6% (n=712), decreased in 35.3% (n=402) and had not changed in 2.1% (n=24). It was identified that the practice of "washing hands with water and soap frequently for at least 20 seconds by rubbing" increased in 89.8% (n=1022), decreased in 1.7% (n=19), and had not changed in 8.5% (n=97). It was determined that the practice of "cleaning of products bought at the shops at home" increased in 83.0% (n=944), decreased in 2.7% (n=31), and had not changed in 14.3% (n=163). Accordingly, the personal protection method



that increased the most was “washing hands frequently with soap and water for at least 20 seconds by rubbing”.

### Knowledge, Attitude and Practices Towards COVID-19 Assessment Questionnaire

The answers and the questions of the knowledge survey have been presented in Table 1 and the average COVID-19 knowledge score was 10.26 (SD: 1.44, range 0-12). This value shows that in general, the participants correctly answered

a proportion of 85.5% (10.26/12\*100). The knowledge statement known most accurately was, “People who have contact with someone infected with the COVID-19 virus

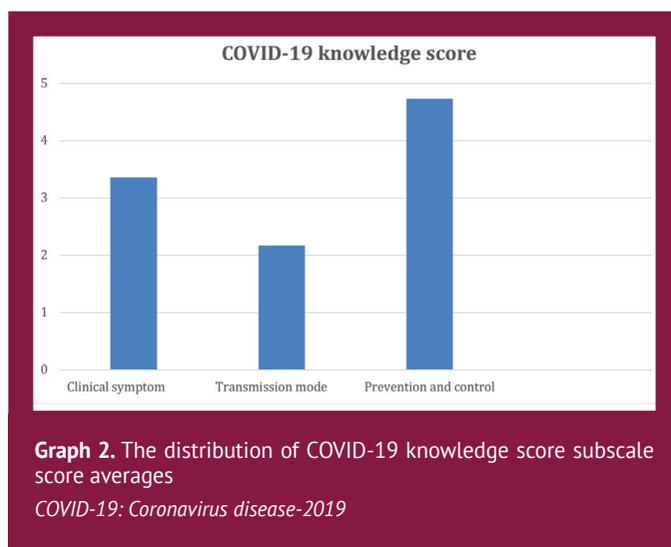
Questions	N	%
K1: The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia.	True	1.102 96.8
	False	17 1.5
	I don't know	19 1.7
	<b>Total</b>	1.138 100
K2: Unlike the common cold, stuffy nose, runny nose, and sneezing are less common in persons infected with the COVID-19 virus.	True	710 62.4
	False	214 18.8
	I don't know	214 18.8
	<b>Total</b>	1.138 100
K3: There currently is no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection.	True	1.075 94.5
	False	24 2.1
	I don't know	39 3.4
	<b>Total</b>	1.138 100
K4: Not all persons with COVID-19 will develop severe infections. Only those, who are elderly, have chronic illnesses and are obese are more likely to become severe cases.	True	927 81.5
	False	156 13.7
	I don't know	55 4.8
	<b>Total</b>	1.138 100
K5: Eating or contacting wild animals would result in infection by the COVID-19 virus.	True	385 33.8
	False	417 36.6
	I don't know	336 29.5
	<b>Total</b>	1.138 100
K6: Persons with COVID-19 cannot infect the virus to others when a fever is not present.	True	23 2
	False	993 87.3
	I don't know	122 10.7
	<b>Total</b>	1.138 100
K7: The COVID-19 virus spreads via respiratory droplets of infected individuals.	True	1.058 93
	False	29 2.5
	I don't know	51 4.5
	<b>Total</b>	1.138 100
K8: All individuals can wear medical masks to prevent the infection by the COVID-19 virus.	True	949 83.4
	False	128 11.2
	I don't know	61 5.4
	<b>Total</b>	1.138 100

Questions	N	%
K9: It is not necessary for children and young adults to take measures to prevent the infection by the COVID-19 virus.	True	48 4.2
	False	1.061 93.2
	I don't know	29 2.5
	<b>Total</b>	1.138 100
K10: To prevent the infection by COVID-19, individuals should avoid going to crowded places such as train stations and avoid public transportation.	True	1.100 96.7
	False	23 2
	I don't know	15 1.3
	<b>Total</b>	1.138 100
K11: Isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus.	True	1.108 97.4
	False	15 1.3
	I don't know	15 1.3
	<b>Total</b>	1.138 100
K12: People who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place. In general, the observation period is 14 days.	True	1.117 98.2
	False	12 1.1
	I don't know	9 0.8
	<b>Total</b>	1.138 100
A1. Do you agree that COVID-19 will finally be successfully controlled?	Agree	678 59.6
	Disagree	137 12
	I don't know	323 28.4
	<b>Total</b>	1.138 100
A2. Do you have confidence that Turkey can win the battle against the COVID-19 virus?	Yes	944 83
	No	194 17
	<b>Total</b>	1.138 100
A3: Do you believe that individuals are complying with the prohibitions/ precautions implemented for COVID-19?	Yes	338 29.7
	No	800 70.3
	<b>Total</b>	1.138 100
P1. In recent days, have you gone to any crowded place?	Yes	168 14.8
	No	970 85.2
	<b>Total</b>	1.138 100
P2. In recent days, have you worn a mask when leaving home?	Yes	1.089 95.7
	No	49 4.3
	<b>Total</b>	1.138 100
P3: Do the individuals in your family comply with the prohibitions?	Yes	1.030 90.5
	No	10 0.9
	<b>Partially</b>	98 8.6
	<b>Total</b>	1.138 100
COVID-19: Coronavirus disease-2019		

should be immediately isolated in a proper location. In general, the observation period is 14 days.” with 98.2%. The least known was “Eating or contact with wild animals would result in the infection by COVID-19”, with 33.8%.

No statistically significant relationship was determined between the COVID-19 knowledge score applied to the participants and age ( $r=-0.019$   $p=0.528$ ).

When the relationship between the demographic variables and the COVID-19 knowledge score was examined, a statistically significant difference was found between gender ( $p=0.027$ ), educational status ( $<0.001$ ), professional status ( $<0.001$ ) and the income status ( $<0.001$ ) (Table 2).



Based on the multiple linear regression analysis, the female gender (compared to men  $\beta:-0.268$ ,  $p=0.030$ ), individuals with high school or higher education (compared to lower than high school,  $\beta: 0.479$ ,  $p=0.008$ ) and white-collar workers (compared to retired/not working  $\beta: -0.141$ ,  $p=0.010$ ) and those with income an income of 4500 TL and higher (compared to 2300 and lower  $\beta: 0.143$ ,  $p=0.039$ ) had statistically significantly high knowledge scores (Table 3).

The subscale scores have been presented in Graph 2. Accordingly, the subscale that was known most was prevention and control, and the least known was the transmission mode.

The assessment of the subscales of the knowledge score and demographic data did not show a statistically significant relationship between clinical symptoms, transmission mode, control and prevention scores, and age ( $r=-0.017$   $p=0.561$ ;  $r=-0.002$   $p=0.942$ ;  $r=-0.003$ , respectively;  $p=0.917$ ). The transmission mode scores showed statistically significant differences between females and males. It was observed that the transmission mode scores were higher in women than in men ( $Z=-3.308$ ,  $p=0.001$ ). There was no relationship between the clinical symptoms, prevention, the control subscales, and gender.

It was observed that the clinical symptom and the transmission mode scores were higher in white-collar participants than in the other profession groups ( $Z=35.702$ ,  $p<0.001$ ;  $Z=21.403$ ,  $p<0.001$ , respectively). It was identified that the prevention and control scores were higher in participants who were retired or not working compared to the other profession groups ( $Z=8.865$ ,  $p=0.031$ ).

**Table 2.** The demographic characteristics of the participants and the analysis of the COVID-19 knowledge score based on demographic variables (n=1138)

Demographic variables		Number of participants (%)	Knowledge score (mean $\pm$ standard deviation)	Z/KV	p
<b>Gender</b>	Female	735 (64.6)	10.3 $\pm$ 1.3	-2.207	<b>0.027</b>
	Male	403 (35.4)	10.1 $\pm$ 1.5		
<b>Age group (years)</b>	20-29	244 (21.4)	10.3 $\pm$ 1.3	0.307	0.858
	30-49	733 (64.4)	10.2 $\pm$ 1.4		
	50-64	161 (14.1)	10.2 $\pm$ 1.4		
<b>Education level</b>	Below high school	75 (6.6)	9.6 $\pm$ 1.9	-3.507	<b>&lt;0.001</b>
	High school and higher	1.063 (93.4)	10.3 $\pm$ 1.3		
<b>Marital status</b>	Married	728 (64.0)	10.3 $\pm$ 1.4	2.934	0.231
	Single	333 (29.3)	10.1 $\pm$ 1.5		
	Divorced/widowed	77 (6.8)	10.1 $\pm$ 1.3		
<b>Professional status</b>	White collar	819 (72.0)	10.4 $\pm$ 1.3	38.182	<b>&lt;0.001</b>
	Blue collar	94 (8.3)	9.6 $\pm$ 2.0		
	Retired/not working student	165 (14.5)	10.0 $\pm$ 1.3		
		60 (5.3)	9.8 $\pm$ 1.6		
<b>Income level</b>	<2.300 TL	181 (15.9)	9.9 $\pm$ 1.5	30.740	<b>&lt;0.001</b>
	2.300-4.500 TL	311 (27.3)	10.1 $\pm$ 1.4		
	>4.500 TL	646 (56.8)	10.4 $\pm$ 1.3		

COVID-19: Coronavirus disease-2019

**Table 3. The multiple linear regression analysis of demographic variables related to the COVID-19 knowledge score**

Variables	$\beta$	Standard error	t	p
Gender (female-male)	-0.268	0.89	-3.011	<b>0.030</b>
Educational level	0.479	0.179	2.670	<b>0.008</b>
Profession	-0.141	0.54	-2.595	<b>0.010</b>
Income level	0.143	0.69	2.071	<b>0.039</b>
COVID-19: Coronavirus disease-2019				

No statistically significant difference was identified between the prevention and control subscale scores and the income levels. It was observed that the clinical symptoms and the transmission mode scores were higher in participants with an income higher than 4500 TL compared to the other income level groups ( $Z=34.969$ ,  $p<0.001$ ;  $Z=7.687$ ,  $p=0.021$ , respectively).

When the attitude questions were reviewed, it was identified that 59.6% of the participants had stated that they agreed that COVID-19 would finally be successfully controlled, 12% stated that they disagreed, and 28.4% stated that they did not know. It was identified that 83% of participants believed that Turkey could win the battle against COVID-19 and 17% did not. It was observed that 29.9% of the participants believed that individuals complied with the prohibitions/precautions implemented for COVID-19 and 70.1% did not.

It was determined that 14.7% of the participants had gone to a crowded place and 85.3% had not. It was determined that 95.7% of the participants used masks when leaving home and 4.3% did not. It was determined that 90.5% of the participants believed that individuals in the family complied with the prohibitions/precautions, 0.9% did not comply and 4.3% partially complied.

In the review of the results of the multiple logistic regression analysis, a significant relationship was determined for the answer “agree” given to the question “Do you agree that COVID-19 will finally be successfully controlled?” between those retired/not working (compared to students OR: 1.59,  $p=0.006$ ), and those with an educational level higher than high school (compared to lower than high school OR: 1.59,  $p=0.006$ ).

The female gender (compared to male OR: 0.59,  $p<0.001$ ) and being a white-collar worker (compared to blue-collar OR: 0.41,  $p=0.021$ ) were found to be significantly associated with the answer “I don’t know” given to the question “Do you agree that COVID-19 will finally be successfully controlled?”

Being married (compared to single OR: 1.59,  $p=0.006$ ) and (compared to others OR: 1.96,  $p=0.017$ ), having an educational level higher than high school (compared to lower than high school OR: 2.45,  $p=0.032$ ) were found to be

significantly associated with the answer “yes” given to the question “Do you have confidence that Turkey can win the battle against the COVID-19 virus?”

The male gender (compared to female OR: 0.63,  $p=0.001$ ), white-collar workers (compared to blue collars OR: 0.55,  $p=0.007$ ), and blue-collar workers (compared to students OR: 2.12,  $p=0.038$ ) were found to be significantly associated with the answer “yes” given to the question “Do you believe individuals follow the prohibitions/precautions for COVID-19?” A significant relationship was determined between being married (compared to single OR: 0.58,  $p=0.003$ ) and (compared to others OR: 0.47,  $p=0.014$ ) having an income level lower than 2300 TL (compared to higher than 4.500 OR: 0.55,  $p=0.029$ ) and going to a crowded place.

Among the demographic variables, a statistically significant difference was only found between the participants’ practice scores and the marital status.

## Discussion

The way to facilitate compliance with transmission prevention efforts is to increase the knowledge level and awareness of the society. In this study, 63.6% ( $n=923$ ) of the participants believed that they had sufficient knowledge about COVID-19. Similar to the studies in the literature, 95.3% of the participants preferred the internet as the source of information (15,16,17,18). The internet has brought a significant change to traditional forms of communication and has irreversibly diversified the dimensions of communication (19).

Today, when internet access is so widespread, it is inevitable that it will be used as an information source. However, it should not be forgotten that correct information can only be obtained from the proper source. For this reason, every country should create official websites and health-themed television channels in their native language to spread information and answer questions through an online response system if necessary.

One out of every four individuals among the participants still wanted to have a test despite not having any complaints. This may be due to the presence of asymptomatic individuals with a COVID-19 infection and their contagiousness (20).

The WHO also emphasizes meticulous attention to personal hygiene rules such as hand washing to prevent transmission through contact (21). Similar to other studies, the participants reported an increase in practicing protective measures such as social distancing, hand hygiene, cleaning of surfaces, ventilation of the environment and cleaning products coming from a store (16,17,22,23). The highest increase was in the handwashing habit, and this is due to this practice being the fundamental preventive practice advised by many health authorities from the first instant.

The score measuring the knowledge sufficiency of the knowledge attitude practice questionnaire applied was 10.26, and this shows that participants answered correctly at a rate of 85.5%. Generally, it was identified that most of the participants of our survey knew about the clinical condition, mode of transmission and the preventive measures. Similar to our studies, in studies investigating the COVID-19 knowledge level, the correct knowledge level was 90% in the study conducted by Zhong et al. (12) and 71.2% in a study carried out in Egypt (17).

In the literature, there are studies showing that increasing the knowledge of individuals during pandemics affects the attitude towards the pandemic and compliance with protective precautions (24,25). For this reason, activities that would inform the public and raise awareness should be included in efforts to prevent pandemics.

Similar to another study, the knowledge score in our study increased statistically significantly in women, in those with a high income and educational level and in white-collar workers (12). The concepts of having a high income and educational level and being a white-collar worker are inter-related. Furthermore, some studies show that there is a positive relationship between education and the knowledge levels (17,23,26).

In our study, the statement “People who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place for 14 days” was answered correctly at the highest rate by the participants (98.2%). The rate of knowledge of this statement was 97.3% in the study by Zhong et al. (12) and 95.8% in the study by Abdelhafiz et al. (17). In our study, the statement “Eating or contacting wild animals would result in the infection by the COVID-19 virus” had the lowest rate (33.8%) of correct answers. The rate of knowing this statement was 91.4% in a study organized in China. In our country, eating wild animals is not preferred due to our religion and cultural structure. Therefore, this aspect is unknown.

According to the subscale scores, prevention and control were the most known, and the transmission mode was the least known. While there was no difference in gender in the other subscales, it was determined that the knowledge status of women about transmission modes was higher than men. This may be due to women paying more attention, because they have several responsibilities in cleaning, hygiene, food, and care of children. The clinical symptoms and transmission modes being known to a higher extent among white-collar workers explains its relationship with high-income levels.

In our study, 40.4% of the participants believed that COVID-19 would unsuccessfully be controlled. This may be

due to the fact that 70.3% of the participants had stated that it is believed that individuals do not comply with protective measures. According to a study performed in China, the rate of believing that prohibitions are being followed was lower (12). However, in our study, it was determined that 83% of the participants believed that Turkey could win the battle against COVID-19. In Turkey, the MoH of Turkey has pursued a transparent policy and access to information, and follow-up of the number of cases has been enabled through the official web site and applications. These efforts have also increased the public confidence in the health infrastructure and caused the majority to believe that Turkey will win this battle.

When we looked at the answers given to the practice questions, most of the individuals stated that they and the people living near them followed the rules. This rate is higher than that of a study in India (22). We believe that this practice compliance is due to the knowledge levels of the participants of our study being higher than that in the India study. Knowledge affects attitudes and practices and increases the compliance.

### Study Limitations

The limitations of our study comprise having been conducted in a single center and the scarcity of similar studies.

### Conclusion

Generally, it was observed that the COVID-19 knowledge levels of the participants in our study were high. In particular, women, those with high educational levels, members of the white-collar profession group and those with high-income levels were more knowledgeable. Official web sites on the internet were used most as information sources. Thus, correct information was obtained from the proper source. In Turkey, the MoH pursued a transparent policy since the first case, and information and daily sharing of new case numbers provided on the official web site may play a role in the high rate of following the official web sites.

Participants showed positive attitudes and practices towards the use of protective measures, which are essential to prevent the transmission of the disease. We think that this result is due to high knowledge levels affecting attitudes and practices.

### Ethics

**Ethics Committee Approval:** Approval for the study was obtained from University of Health Sciences Turkey, Prof. Dr. Cemil Taşcıoğlu City Hospital HPRC Ethics Committee with the decision numbered 129 on 28.04.2020.

**Informed Consent:** A voluntary consent form was added to the questionnaire and those who were approved were included in the study.

**Peer-review:** Externally peer-reviewed.

### Authorship Contributions

Surgical and Medical Practices: B.G.T., H.R.S., G.Z.Ö., S.G.A., M.T.E., Concept: B.G.T., H.R.S., G.Z.Ö., Ş.G.A., M.T.E., Design: B.G.T., H.R.S., G.Z.Ö., S.G.A., M.T.E., Data Collection or Processing: B.G.T., Analysis or Interpretation: B.G.T., H.R.S., G.Z.Ö., Literature Search: B.G.T., H.R.S., G.Z.Ö., S.G.A., M.T.E., Writing: B.G.T., H.R.S., G.Z.Ö.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study received no financial support.

### References

- McIntosh K, Becker WB, Chanock RM. Growth in suckling-mouse brain of "IBV-like" viruses from patients with upper respiratory tract disease. *Proc Natl Acad Sci U S A*. 1967;58:2268-2273. [Crossref]
- Drosten C, Günther S, Preiser W, van der Werf S, Brodt HS, Becker S, et al. Identification of a novel coronavirus in patients with severe acute respiratory syndrome. *N Engl J Med*. 2003;348:1967-1976. [Crossref]
- Zaki AM, van Boheemen S, Bestebroer TM, Osterhaus ADME, Fouchier RAM. Isolation of a novel coronavirus from a man with pneumonia in Saudi Arabia. *N Engl J Med*. 2012;367:1814-1820. [Crossref]
- Lu H, Stratton CW, Tang YW. Outbreak of pneumonia of unknown etiology in Wuhan, China: The mystery and the miracle. *J Med Virol*. 2020;92:401-402. [Crossref]
- RoT Ministry of Health 2019-nCoV Disease Healthcare Workers Guide, 2020 Available from: [https://covid19bilgi.saglik.gov.tr/depo/rehberler/COVID-19\\_Rehberi.pdf](https://covid19bilgi.saglik.gov.tr/depo/rehberler/COVID-19_Rehberi.pdf) Accessed on: 25.05.2020
- <https://covid19.saglik.gov.tr/> Accessed on: 25.05.2020.
- Er AG, Ünal S. 2019 Coronavirus Outbreak - Instant Status and First Impressions. *FLORA*. 2020;25:1-8. [Crossref]
- Chan JF, Yuan S, Kok KH, To KK, Chu H, Yang J, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet*. 2020;395:514-523. [Crossref]
- Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-2019). February 16-24, 2020. Available at: <http://www.who.int/docs/defaultsource/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf> Accessed: 25.05.2020.
- <https://www.icisleri.gov.tr/65-yas-ve-ustu-ile-kronik-rahatsızligi-olanlara-sokaga-cikma-yasagi-genelgesi>. Accessed: 25.05.2020
- <https://www.icisleri.gov.tr/sokaga-cikma-yasagi-bulunan-18-20-yas-arasindaki-genclerle-ilgili-istisnalar>. Accessed: 25.05.2020
- Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, et al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *Int J Biol Sci*. 2020;16:1745-1752. [Crossref]
- Cronbach LJ. Coefficient alpha and the internal structure of tests. *Psychometrika*. 1951;16.3:297-334.
- Bowling A, Ebrahim S. Handbook of health research methods: investigation, measurement and analysis. McGraw-Hill Education (UK), 2005. [Crossref]
- Saqlain M, Munir MM, Rehman SU, Gulzar A, Naz S, Ahmed Z, et al. Knowledge, attitude, practice and perceived barriers among healthcare professionals regarding COVID-19: A Cross-sectional survey from Pakistan. *J Hosp Infect*. 2020;105:419-423. [Crossref]
- Chen Y, Lin YL, Zhu LJ, Fang ZM, Wu N, Du MX, et al. [The network investigation on knowledge, attitude and practice about Novel coronavirus pneumonia of the residents in Anhui Province.] *Zhonghua Yu Fang Yi Xue Za Zhi*. 2020;54:E004. [Crossref]
- Abdelhafiz AS, Mohammed Z, Ibrahim ME, Ziady HH, Alorabi M, Ayyad M, et al. Knowledge, Perceptions, and Attitude of Egyptians Towards the Novel Coronavirus Disease (COVID-19). *J Community Health*. 2020;45:881-890. [Crossref]
- Khan MU, Shah S, Ahmad A, Fatokun O. Knowledge and attitude of healthcare workers about middle east respiratory syndrome in multispecialty hospitals of Qassim, Saudi Arabia. *BMC Public Health*. 2014;14:1281. [Crossref]
- Erdoğan, İ. Scope and Limits of Determining an Ethical Paradigm in New Media Journalism, New Media Practices, Opportunities, Editor: Emel Baştürk Akca, Istanbul: Umuttepe Publications 2014, p.80. Available from: [file:///C:/Users/Adminsepc1/Downloads/3\\_makale\\_yeni\\_medya\\_gazeteciliginde\\_etik\\_bir\\_paradigma\\_belirlemenin\\_kapsam%C4%B1\\_ve\\_sinirlari%20\(1\).pdf](file:///C:/Users/Adminsepc1/Downloads/3_makale_yeni_medya_gazeteciliginde_etik_bir_paradigma_belirlemenin_kapsam%C4%B1_ve_sinirlari%20(1).pdf) Accessed: 25.05.2020
- Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C, et al. Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany. *N Engl J Med*. 2020;382:970-971. [Crossref]
- Coronavirus disease (COVID-19). Available from: [https://www.who.int/health-topics/coronavirus#tab=tab\\_1](https://www.who.int/health-topics/coronavirus#tab=tab_1) Accessed 25.05.2020. [Crossref]
- Roy D, Tripathy S, Kar SK, Sharma N, Verma SK, Kaushal V. Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian J Psychiatr*. 2020;51:102083. [Crossref]
- Haque T, Hossain KM, Bhuiyan MR, Ananna SA, Hussain A, Islam MR, et al. Knowledge, attitude and practices (KAP) towards COVID-19 and assessment of risks of infection by SARS-CoV-2 among the Bangladeshi population: An online cross sectional survey. 16 September 2020, PREPRINT (Version 2) available at Research Square [Crossref]
- Ilesanmi O, Alele FO. Knowledge, Attitude and Perception of Ebola Virus Disease among Secondary School Students in Ondo State, Nigeria, October, 2014. *PLoS Curr*. 2016;8:ecurrents.outbreaks.c04b88cd5cd03cccb99e125657eecd76. [Crossref]
- Ajilore K, Atakiti I, Onyenankye K. College students' knowledge, attitudes and adherence to public service announcements on Ebola in Nigeria: Suggestions for improving future Ebola prevention education programmes. *Health Education Journal*. 2017;76:648-660. [Crossref]
- Zegarra-Valdivia J, Vilca BNC, Guerrero RJA. Knowledge, perception and attitudes in Regard to COVID-19 Pandemic in Peruvian Population. April 2020. Accessed 25.05.2020 [Crossref]