Effect of health anxiety on disease perception and treatment compliance in elderly patients during the COVID-19 pandemic in Turkey

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A B S T R A C T

Purpose: This study aimed to determine the effect of health anxiety experienced by elderly individuals during the coronavirus disease 2019 (COVID-19) pandemic on their disease perception and treatment compliance.
Design and methods: This was a descriptive, cross-sectional study conducted between November 2020 and March 2021. The research data was collected using the Patient Information Form, Health Anxiety Scale (HAS), Disease Perception Scale-Short Form (DPS-SF) and Turkish Modified Morisky Treatment Compliance Scale (MMTCS).
Results: Of the 401 study participants, 63.1% were in the 65–69 years age group. The mean HAS, DPS-SF and MMTCS motivation and knowledge level sub-dimension scores of the participants were 18.73 ± 8.87, 54.24 ± 9.98, 1.28 ± 0.74 and 2.04 ± 0.92, respectively.
Conclusion: The results of this study showed that the health anxiety and disease perception scores were high among elderly individuals during the COVID-19 pandemic, which hindered their treatment compliance.

Introduction

Infectious diseases have had significant impact on human history, and despite scientific and technological advancements they continue to do so in current times as well (Guan et al., 2020). The coronavirus disease 2019 (COVID-19) is a highly contagious viral disease that emerged in China in 2019 and spread rapidly, continuing to have grave economic, cultural, social and psychological effects to date (Guan et al., 2020; Onder et al., 2020; Saladino et al., 2020). As has been observed in several previous outbreaks, such as severe acute respiratory syndrome (SARS), Ebola and influenza, elderly individuals were the most affected by the COVID-19 pandemic (Dymecka et al., 2021; Hasöksüz et al., 2020; Onder et al., 2020). According to Brooke and Jackson, 3.6% of individuals aged 60 years and above and 8%–14.8% of individuals in their 70s and 80s are at a risk of death from COVID-19 (Brooke & Jackson, 2020). Elderly individuals have constituted the high-risk group since the beginning of the pandemic, and similar to the measures taken in several countries, curfews in Turkey were first geared towards the elderly population, causing them to face numerous problems (Kılınçel et al., 2020; Verity et al., 2020). Literature data reports that the fear of COVID-19 infection reduces the quality of life (Satici et al., 2020), negatively affects the well-being of individuals (Erdoğdu et al., 2020; Li

et al., 2020) and leads to mental health problems, such as stress, depression and anxiety (Saladino et al., 2020).

A Hong Kong study conducted on elderly individuals reported that the participants felt anxious and hopeless regarding the COVID-19 pandemic, which affected their daily lives and increased their health anxiety (Kwok et al., 2020). Health anxiety is a psychological experience characterized by a perceived threat to one's health, which triggers the symptoms of physical and emotional anxiety (Aydemir et al., 2013). Increased health anxiety negatively affects disease perception and hinders the adaptability of the individual regarding the process of their treatment compliance (Aalto et al., 2005). Adaptability refers to the fulfilment of lifestyle changes (Krousel-Wood et al., 2009) and treatment compliance concerns attending all health check-ups, regularly participating in the treatment programme, using the prescribed drugs without interruption and applying the recommended behavioral patterns in daily life (Demirkol et al., 2015). The restrictions introduced during the COVID-19 pandemic hampered the elderly individuals' ability to leave their homes, attend health check-ups and continue regular treatment (Chhetri et al., 2020), in turn significantly affecting their treatment compliance. Furthermore, non-compliance with treatment increases the severity of the disease and cost of treatment and reduces the patients' faith in treatments (Demirkol et al., 2015).

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The aim of this study was to assess the health anxiety experienced by elderly individuals during the COVID-19 pandemic and evaluate the effect of health anxiety on their disease perception and treatment compliance. The following research questions were proposed for this purpose:

- What is the health anxiety level of elderly individuals?
- What is the disease perception level of elderly individuals?
- What is the treatment compliance level of elderly individuals?
- Is there a relationship between the socio-demographic characteristics of elderly individuals and their health anxiety levels, disease perception and treatment compliance?
- Are the health anxiety levels of elderly individuals affected by disease perception and treatment compliance?

Methods

Study design and sample

This research was designed as a descriptive and cross-sectional study. The study population comprised 7,550,000 elderly individuals who were registered in the Turkish Population Statistics Agency (2020). This study aimed to cover all the elderly individuals living in Turkey. Using power analysis, the minimum sample size was calculated as 384 with a 5% margin of error and 95% confidence level. Owing to the Covid-19 pandemic, the participant data was collected via online surveys (Google Forms). The study purpose was outlined in the title section of the online forms. The participants were informed that the data would be used in a scientific study, and written informed consent was obtained from all the participants. The study sample consisted of 401 elderly participants who agreed to the study. The research data were collected between November 2020 and March 2021. It took the participants approximately 15–20 min to fill out the online form.

Data collection tools

The Patient Information Form, Health Anxiety Scale (HAS), Disease Perception Scale-Short Form (DPS-SF) and Turkish Modified Morisky Treatment Compliance Scale (MMTCS) were used for data collection.

Patient Information Form

This form was developed by the researchers in accordance with the literature. The form contained 18 questions about the socio-demographic characteristics (marital status, age, gender, etc.) and disease status (chronic diseases, COVID-19 positivity, COVID-19 knowledge level, etc.) of the participants (Demirkol et al., 2015; Hasöksüz et al., 2020; Li et al., 2020; Xie et al., 2020).

Health Anxiety Scale

This scale was developed by Salkovskis et al. (2002). The Turkish validity and reliability study was conducted by Aydemir et al. (2013). The HAS is a self-report scale comprising 18 items. Each item is scored between 0 and 3. The highest score that can be obtained is 54, with higher scores indicating high levels of health anxiety (Aydemir et al., 2013; Salkovskis et al., 2002). The Cronbach's alpha coefficient of the Turkish version was found to be 0.91 (Aydemir et al., 2013). In the present study, the Cronbach's alpha coefficient was 0.91.

Disease Perception Scale-Short Form

This scale was developed by Broadbent et al. (2006) and the Turkish validity and reliability study was conducted by Kocaman et al. (2007). The DPS-SF consists of nine items regarding the cognitive and emotional representation of disease perception. Each item is scored between 0 and

10. The total score that can be obtained ranges between 0 and 80. Higher scores indicate higher disease perception (Broadbent et al., 2006; Kocaman et al., 2007). The Cronbach's alpha coefficient of DPS-SF was reported by Broadbent et al. (2006) as 0.82. In the present study, the Cronbach's alpha coefficient was 0.83.

Turkish Modified Morisky Treatment Compliance Scale

This scale was developed by Morisky et al. (1986) and consists of eight items. The Turkish validity and reliability study was conducted by Vural et al. (2012). The Turkish MMTCS consists of six items. The scale has two sub-dimensions: motivation and knowledge level. All items are 'yes/no' questions. Yes corresponds to 0 points and no to 1 point. A sub-dimension score of 0 or 1 indicates low motivation and knowledge levels, whereas a score above 1 indicates high motivation and knowledge levels. In the present study, the Cronbach's alpha coefficient for the overall scale was 0.51, 0.55 for the motivation sub-dimension and 0.59 for the knowledge level sub-dimension.

Ethical considerations

Ethical approval was obtained from the Scientific Research Ethics Committee of the relevant university (decision no. 2020/111). The individuals were asked to 'accept' or 'reject' participating in the study by selecting the appropriate option on the online forms (Google Forms). The study was conducted in accordance with the principles of the Helsinki Declaration. Written permissions were obtained via e-mail from the authors of the scales used in the study.

Data analysis

The research data was analysed using the SPSS (Windows 25.0) programme. Descriptive statistics were presented as number, percentage, minimum and maximum values, median, mean and standard deviation. Conformity to normal distribution was evaluated using normality tests and Kurtosis–Skewness values. The scale scores were found to be not normally distributed. Hence, Mann–Whitney U test was used to compare the quantitative variables between the two groups and Kruskal–Wallis H test was used to compare the quantitative variables between more than two groups. In cases with significant differences, Bonferroni correction was performed to determine the source of the difference. The relationship among the continuous variables was assessed by Spearman correlation analysis (George & Mallery, 2018).

Results

The demographic characteristics and COVID-19-related information of the participants is shown in Table 1. Of the 401 participants, 63.1% were 65–69 years old, 54.6% were women, 57.6% were married, 63.1% were literate and 82.5% were retired. Regarding the COVID-19-related data, 44.9% of the participants had been tested for COVID-19, 14.7% had been diagnosed with COVID-19, 78.6% had at least one relative who was diagnosed with COVID-19 and 36.9% stated that their daily lives were significantly impacted by COVID-19. During the pandemic, 37.2% of the participants stated that they were unable to do activities/walk, 19.0% could not go to the hospital for health check-ups, 25.2% expressed concerns regarding having to stay away from their family and loved ones and 18.0% reported an increase in psychological problems. Furthermore, 70.3% of the participants reported that COVID-19 affected their health and treatment process and 72.6% reported experiencing anxiety concerning their own health as well as the health of their loved ones during the pandemic (Table 1).

The mean HAS, DPS-SF and MMTCS motivation and knowledge level sub-dimension scores of the participants were 18.73 ± 8.87, 54.24 ± 9.98, 1.28 ± 0.74 and 2.04 ± 0.92, respectively.

No statistically significant correlation was found between the total

Table 1
Demographic characteristics and COVID-19-related information of the participants ($n = 401$).

Variables		n	%	COVID-19-related information		n	%
Age	65–69 years	253	63.1	Getting a COVID 19 test	Yes	180	44.9
	70–74 years	96	23.9		No	221	55.1
	75–79 years	30	7.5	Getting a diagnosis of COVID-19	Yes	59	14.7
	Above 80 years	22	5.5		No	342	85.3
Gender	Female	219	54.6	Having a family history of COVID-19	Yes	315	78.6
	Male	182	45.4		No	86	21.4
Marital status	Married	231	57.6	Impact of COVID-19 on daily life	None	49	12.2
	Single	17	4.2		Somewhat	204	50.9
	Widowed	153	38.2		Quite	148	36.9
Education	Literate	253	63.1	Feelings of COVID-19	None	52	13.0
	Primary/secondary school	96	23.9		Fear	26	6.5
	High school	33	8.2		Anxiety	122	30.4
	Graduate or postgraduate	19	4.7		Hopelessness	26	6.5
Working status	Worker	12	3.0		Fear of death/loss	175	43.6
	Retired	331	82.5	Worrying about your own/loved ones' health	Yes	291	72.6
	Unemployed	58	14.5		No	15	3.7
					Sometimes	95	23.7

HAS and DPS-SF scores; however, a statistically significant positive correlation between the total HAS and MMTCS knowledge sub-dimension scores was observed by correlation analysis ($r = 0.123$; $p < 0.05$) (Table 2).

Data on the relationship between the socio-demographic characteristics of the elderly participants and their scale scores are presented in Table 3. A significant difference was found in MMTCS sub-dimension scores with regard to participant age ($p = 0.02$). It was found that the HAS scores of the unemployed participants were higher compared with the retired participants ($p = 0.014$). The MMTCS motivational sub-dimension scores of the unemployed participants were higher compared with the working participants ($p = 0.002$). The MMTCS knowledge level sub-dimension scores of the retired participants were higher compared with the working and unemployed participants ($p = 0.001$) (Table 3).

The HAS, DPS-SF and MMTCS scores of the participants with respect to COVID-19-related characteristics are presented in Table 4. A significant difference was found in the HAS ($p = 0.0001$) and MMTCS sub-dimension scores ($p = 0.036$) between the COVID-19 tested and untested participants. In addition, the HAS scores ($p = 0.0001$) of the participants who were diagnosed with COVID-19 was found to be higher than that of the participants who were not diagnosed with COVID-19. The HAS ($p = 0.0001$) and MMTCS sub-dimension scores ($p = 0.043$) of the participants who had a relative diagnosed with COVID-19 were higher than that of the participants who did not have a relative diagnosed with COVID-19. The motivation sub-dimension scores ($p = 0.007$) of the participants who had no relative diagnosed with COVID-19 were higher than those with a relative diagnosed with COVID-19. The HAS ($p = 0.0001$) and MMTCS motivation sub-dimension scores ($p = 0.0001$) of the participants whose daily lives were seriously affected by COVID-19

were higher than those who were mildly affected or unaffected by the COVID-19 pandemic. The HAS scores of the participants who experienced severe fear due to the COVID-19 pandemic were higher than the other participants. Similarly, the HAS scores were higher among the participants who experienced the fear of death and loss, high levels of anxiety and hopelessness owing to the COVID-19 pandemic than those who were unaffected ($p = 0.0001$). The DPS-SF scores of the participants who experienced the fear of death and loss related to COVID-19 were higher than those who experienced anxiety ($p = 0.006$). The MMTCS sub-dimension scores of the participants who experienced the fear of death and loss were higher compared with the participants who were fearful and experienced anxiety regarding COVID-19 ($p = 0.0001$). The HAS ($p = 0001$), DPS-SF ($p = 0001$) and MMTCS motivation ($p = 0.012$) and knowledge level ($p = 0.005$) sub-dimension scores were higher among the participants whose sleep patterns were negatively affected by the COVID-19 pandemic compared with the participants whose sleep patterns were unaffected. The HAS ($p = 0.0001$), DPS-SF ($p = 0.004$) and MMTCS motivation sub-dimension ($p = 0.046$) scores were higher among the participants who paid more attention to their health during the COVID-19 pandemic than that of the rest of the participants (Table 4).

Discussion

Understanding and outlining the effects of psychological factors, such as health anxiety and disease perception, associated with epidemics is imperative for their appropriate management. This research evaluated the effect of health anxiety experienced by elderly individuals during the COVID-19 pandemic on disease perception and treatment compliance.

While no statistically significant difference was found in the HAS and DPS-SF scores with regard to the age of the elderly individuals participating in the study, a significant difference was found among the MMTCS knowledge level sub-dimension scores ($p < 0.05$). COVID-19 leads to high morbidity and mortality rates in elderly individuals; thus, the significant difference between the age groups is an expected result. Although not significantly, the health anxiety and disease perception also differs across the age groups of the elderly participants of this study. The participants between the ages of 70 and 74 years demonstrated higher treatment compliance than the individuals aged 69 years and under. The comorbidities and prescribed medication of the study participants also differed. Kılınçel et al. (2020) reported that home quarantine caused the development of anxiety symptoms in 14%–20% of the geriatric population in Turkey. A study conducted by Tian et al. (2020) in China during the COVID-19 pandemic concluded that people above the age of 50 years tended to demonstrate more obsessive-compulsive symptoms, interpersonal sensitivity, phobic anxiety and

Table 2
The correlation between the scales.

	HAS	DPS-SF	Turkish MMTCS motivation sub-dimension	Turkish MMTCS knowledge sub-dimension
HAS	1.000			
DPS-SF	0.014	1.000		
Turkish MMTCS motivation sub-dimension	0.083	−0.064	1.000	
Turkish MMTCS knowledge sub-dimension	**0.123***	−0.119*	0.123*	1.000

HAS: Health Anxiety Scale; DPS-SF: Disease Perception Scale-Short Form; Turkish MMTCS: Turkish Modified Morisky Treatment Compliance Scale. * Correlation is significant at the 0.05 level (two-tailed)

Table 3

Comparison of descriptive characteristics of elderly and HAS, DPS-SF, Turkish MMTCS scores.

Variable (n = 401)		HAS		DPS-SF		Turkish MMTCS			
						Motivation sub-dimension		Knowledge sub-dimension	
		$\overline{X} \pm$ SD	Statistical analysis	$\overline{X} \pm$ SD	Statistical analysis	$\overline{X} \pm$ SD	Statistical analysis	$\overline{X} \pm$ SD	Statistical analysis
Age	65–70[1] years	19.02 ± 8.97	KW = 1.344 p = 0.719	54.98 ± 10.8	KW = 5.837 p = 0.120	1.29 ± 0.76	KW = 2.640 p = 0.451	**1.93 ± 0.98**	**KW = 9.856 p = 0.020**
	71–75[2] years	17.64 ± 7.95		53.32 ± 8.17		1.21 ± 0.63		**2.26 ± 0.71**	**1 < 2**
	76–80[3] years	19.53 ± 8.88		52.00 ± 9.06		1.33 ± 0.76		2.30 ± 0.84	
	Above 80 years[4]	19.09 ± 11.46		52.86 ± 7.76		1.50 ± 0.80		2.00 ± 0.98	
Gender	Female	19.81 ± 9.49	MWU = −1.803 p = 0.071	54.83 ± 10.07	MWU = −1.628 p = 0.103	1.32 ± 0.76	MWU = −1.140 p = 0.254	1.97 ± 0.93	MWU = −1.93 p = 0.054
	Male	17.43 ± 7.88		53.54 ± 9.85		1.24 ± 0.69		2.13 ± 0.90	
Marital status	Married	18.95 ± 8.98	KW = 0.792 p = 0.673	53.53 ± 10.48	KW = 3.058 p = 0.217	1.32 ± 0.77	KW = 2.313 p = 0.315	2.04 ± 0.96	KW = 1.856 p = 0.395
	Single	18.88 ± 7.84		57.24 ± 11.13		1.06 ± 0.83		1.71 ± 1.10	
	Widowed	18.38 ± 8.84		54.98 ± 8.96		1.25 ± 0.65		2.08 ± 0.83	
Education	Literate[1]	18.57 ± 9.11	KW = 1.906 p = 0.592	54.51 ± 9.09	KW = 6.979 p = 0.073	1.24 ± 0.59	KW = 2.963 p = 0.397	**2.17 ± 0.81**	**KW = 20.773 p = 0.0001**
	Primary/secondary school[2]	18.81 ± 7.89		55.49 ± 9.66		1.34 ± 0.79		1.98 ± 1.01	**4 < 1**
	High school[3]	18.97 ± 10.66		51.76 ± 14.63		1.27 ± 1.04		1.67 ± 1.05	
	Graduate or postgraduate[4]	20.00 ± 7.35		48.63 ± 11.30		1.58 ± 1.26		**1.21 ± 1.08**	
Working status	Worker[1]	19.42 ± 5.99	**KW = 8.539 p = 0.014**	50.58 ± 8.55	KW = 3.062 p = 0.216	**0.67 ± 0.78**	**KW = 12.448 p = 0.002**	**0.67 ± 0.89**	**KW = 58.907 p = 0.001**
	Retired[2]	**17.91 ± 8.21**	**2 < 3**	54.2 ± 9.99		1.28 ± 0.7	**1 < 3**	**2.23 ± 0.75**	
	Unemployed[3]	**23.28 ± 11.4**		55.26 ± 10.1		**1.41 ± 0.82**		**1.26 ± 1.13**	**1 < 2, 3 < 2**

Note: Bold markers in the table show statistically significant relationships; Superscripts 1-4: shows groups; HAS: Health Anxiety Scale; DPS-SF: Disease Perception Scale-Short Form; Turkish MMTCS: Turkish Modified Morisky Treatment Compliance Scale.

P < 0.05, MWU = Mann Whitney U Testi; KW = Kruskal Wallis H Testi

psychotic symptoms during the pandemic. In addition, Tian et al. (2020) reported higher health anxiety levels among the elderly population compared with the other age groups.

Although the HAS, DPS-SF and MMTCS scores were higher among the female participants, the difference between the sexes was not statistically significant (p > 0.05). Previous studies on other epidemics, such as SARS and Ebola, (Affleck et al., 2018; Albert, 2015; Lehmann et al., 2015; Lin et al., 2007) reported that women were more likely to be adversely affected by an epidemic and experience higher levels of anxiety and depression than men. However, measures such as curfews, which have forced both men and women to stay home, work from home and undertake household responsibilities such as cleaning, meeting the needs of the family members, cooking for more number of people and other chores, have led to an increase in the anxiety levels of both men and women during the COVID-19 pandemic.

No statistically significant difference was found in the HAS and DPS-SF scores of the elderly individuals with respect to educational level (p > 0.05). This is likely because of the similar social and health restrictions, forced lifestyle changes and visitor restrictions that were implemented for all individuals regardless of education level during the COVID-19 pandemic. However, a statistically significant difference was found in the MMTCS knowledge level sub-dimension scores with respect to the educational status of the elderly (p < 0.05). It was found that the mean knowledge level score of the literate participants was higher than that of the university graduates. In contrary, Tian et al. (2020) and Öztürk et al. (2011) reported that increase in the level of knowledge also increased compliance with treatment. Some studies have emphasized

that the non-compliance with treatment that is observed in elderly individuals is associated with their individual development and education level (Krousel-Wood et al., 2009). In the present study, the difference in the knowledge level scores between the literate and university graduate elderly participants may have been due to elderly individuals with higher education levels spending longer time on social media during the COVID-19 pandemic and the associated effect of misinformation and confusion. Furthermore, the low number of university graduates participating in the study may have been an additional factor.

The World Health Organization (2021) has recommended certain guidelines regarding the protection of the elderly population from the negative effects of the pandemic, including curfews for individuals above the age of 65 years; the elderly population were asked to remain at home and the elderly individuals who were employed were asked to work from home to reduce the spread of the virus as well as its mortality rate. The difference in the DPS-SF scores with regard to the employment status of the participants was not statistically significant (p > 0.05), indicating that disease perception has increased in all the elderly individuals regardless of their employment status. Furthermore, the HAS scores of the participants who were unemployed were higher than that of the retired participants. Workplace closure, economic difficulties, following protective measures against the COVID-19 pandemic and the lack of access to sheltered households, clothes, cleaning, hygiene and adequate nutritional support directly affected the health anxiety of individuals during the COVID-19 pandemic. A statistically significant difference was found among the MMTCS motivational sub-dimension scores with respect to the employment status of the participants (p <

Table 4

Comparison of COVID-19–related features of elderly and HAS, DPS-SF, Turkish MMTCS scores.

Variable (n = 401)		HAS		DPS-SF		Turkish MMTCS			
							Motivation sub-dimension		Knowledge sub-dimension
		$\overline{X} \pm$ SD	Statistical analysis	$\overline{X} \pm$ SD	Statistical analysis	$\overline{X} \pm$ SD	$\overline{X} \pm$ SD	$\overline{X} \pm$ SD	Statistical analysis
Getting a COVID 19 test	Yes	20.84 ± 8.39	**MWU = −4.717** **p = 0.0001**	53.68 ± 10.13	MWU = −0.615 p = 0.538	1.28 ± 0.77	MWU = −0.290 p = 0.772	2.11 ± 0.98	**MWU = −2.094** **p = 0.036**
	No	17.00 ± 8.89		54.70 ± 9.85		1.29 ± 0.70		1.99 ± 0.87	
Getting a diagnosis of COVID-19	Yes	24.85 ± 8.73	**MWU = −5.520** **p = 0.0001**	53.03 ± 10.08	MWU = −1.066 p = 0.286	1.37 ± 0.95	MWU = −0.552 p = 0.581	2.12 ± 1.13	MWU = −1.834 p = 0.067
	No	17.67 ± 8.47		54.45 ± 9.96		1.27 ± 0.69		2.03 ± 0.88	
Having a family history of COVID-19	Yes	19.98 ± 8.89	**MWU = −5.783** **p = 0001**	54.11 ± 10.19	MWU = −0.345 p = 0.730	1.25 ± 0.71	**MWU = −2.028** **p = 0.043**	2.10 ± 0.91	**MWU = −2.674** **0.007**
	No	14.15 ± 7.14		54.71 ± 9.19		1.42 ± 0.79		1.83 ± 0.94	
Impact of COVID-19 on daily life	None[1]	8.41 ± 5.26	**KW = 107.06** **p = 0001** **1 < 2 1 < 3 2 < 3**	54.10 ± 8.91	**KW = 0.517** p = 0.772	1.22 ± 0.55	**KW = 24.537** **p = 0001** **1 < 3 2 < 3**	2.14 ± 0.61	**KW = 0.726** p = 0.696
	Somewhat[2]	17.97 ± 6.91		53.88 ± 10.15		1.12 ± 0.57		2.01 ± 0.91	
	Quite[3]	23.2 ± 9.09		54.78 ± 10.11		1.53 ± 0.90		2.04 ± 1.02	
Feelings of COVID-19	None[1]	8.23 ± 5.12	**KW = 109.934** **p = 0001** **1 < 2 1 < 3 1 < 4 1 < 5 3 < 2 4 < 2 5 < 2 3 < 5**	51.81 ± 11.73	**KW = 14.609** **p = 0006** **3 < 5**	1.31 ± 0.64	KW = 6.664 p = 0.155	2.06 ± 0.7	**KW = 26.158** **p = 0001** **3 < 5 2 < 5**
	Fear[2]	25.46 ± 7.16		54.92 ± 10.63		1.58 ± 0.9		1.38 ± 1.2	
	Anxiety[3]	17.59 ± 7.09		52.56 ± 9.79		1.29 ± 0.78		1.86 ± 0.93	
	Hopelessness[4]	20.81 ± 8.65		52.35 ± 9.84		1.12 ± 0.71		2.04 ± 1.04	
	Fear of death/loss[5]	21.33 ± 8.48		56.32 ± 9.11		1.26 ± 0.69		2.26 ± 0.84	
Impact of COVID-19 on treatment	Yes	20.68 ± 8.49	**MWU = −6.375** **p = 0001**	56.17 ± 9.06	**MWU = −6.114** **p = 0001**	1.28 ± 0.71	MWU = −0.288 p = 0.77	2.10 ± 0.90	**MWU = −2.290** **p = 0.022**
	No	14.10 ± 8.02		49.67 ± 10.58		1.29 ± 0.78		1.89 ± 0.95	
Worrying about your own/loved ones' health	Yes[1]	21.00 ± 8.39	**KW = 74.947** **p = 0001** **2 < 1 3 < 1**	54.72 ± 10.19	KW = 3.497 p = 0.174	1.30 ± 0.76	KW = 0.789 p = 0.674	2.06 ± 0.94	KW = 2.209 p = 0.331
	No[2]	9.73 ± 5.74		52.20 ± 11.40		1.20 ± 0.77		1.73 ± 1.03	
	Sometimes[3]	13.19 ± 7.26		53.09 ± 8.99		1.24 ± 0.65		2.03 ± 0.83	
Having sleep problems	Yes[1]	22.30 ± 8.61	**KW = 77.129** **p = 0001** **2 < 1 3 < 1**	56.52 ± 9.38	**KW = 21.159** **p = 0001** **2 < 1 3 < 1**	1.32 ± 0.75	**KW = 8.784** **p = 0.012** **2 < 1. 3 < 1**	2.12 ± 0.95	**KW = 10.650** **p = 005** **2 < 1**
	No[2]	12.14 ± 7.86		49.86 ± 11.22		1.47 ± 0.94		1.78 ± 0.93	
	Sometimes[3]	17.63 ± 7.27		53.64 ± 9.15		1.14 ± 0.53		2.07 ± 0.86	
The state of caring about health	Yes	20.38 ± 8.35	**MWU = −8.408** **p = 0.0001**	54.83 ± 10.01	**MWU = −2.847** **p = 0.004**	1.32 ± 0.76	**MWU = −2.000** **p = 0.046**	2.03 ± 0.95	MWU = −0.106 p = 0.916
	No	10.65 ± 6.64		51.34 ± 9.37		1.12 ± 0.56		2.09 ± 0.77	

Note: Bold markers in the table show statistically significant relationships; Superscripts 1-4: shows groups; HAS: Health Anxiety Scale; DPS-SF: Disease Perception Scale-Short Form; Turkish MMTCS: Turkish Modified Morisky Treatment Compliance Scale.
$P < 0.05$, MWU = Mann Whitney U Testi; KW = Kruskal Wallis H Testi.

0.05). The motivation and knowledge level scores were higher among the unemployed participants compared with the working participants. This suggests that the participants do not consider their workplaces to be safe during the COVID-19 pandemic or consider the protective measures taken by their workplaces to be insufficient.

It was also found that the mean HAS score of the elderly individuals who had been tested for COVID-19 were higher than that of the individuals who had not been tested. This result indicates that the elderly people with high health anxiety are more likely to take precautions regarding their health; however, the higher mortality rate among the elderly population may have a contributing effect as well. Additionally, the emphasis on the elderly and those with chronic diseases as the primary risk group for COVID-19 in the media at the beginning of the pandemic played a role. Guan et al. (2020) reported a higher risk of

mortality with regard to COVID-19 in individuals above the age of 60 years and in those with serious and chronic conditions.

In the present study, the mean HAS scores of the elderly individuals diagnosed with COVID-19 was higher than that of those who were not diagnosed with COVID-19. A previous study analysing Chinese data reported that the hospitalization rates following COVID-19 diagnosis increased with age, with a hospitalization rate of 18% for those above the age of 80 years (Verity et al., 2020). Furthermore, China Center for Disease Control and Prevention reported an 8%–15% COVID-19 mortality rate in individuals aged 70–80 years and above (Wu & McGoogan, 2020). In Italy, the mortality rate was 12%–20% for the same age group (Onder et al., 2020), and 80% of the people that died from COVID-19 in the United States were ≥65 years old (CDC, 2020). It is highly likely that these significant mortality rates had an impact on the health anxiety

levels of the elderly population.

In the present study, the HAS and MMTCS knowledge level sub-dimension scores of the elderly individuals diagnosed with COVID-19 were higher than the rest of the participants. In addition, the MMTCS motivation sub-dimension scores of the participants who did not have a relative diagnosed with COVID-19 were higher compared with the participants who had a relative diagnosed with COVID-19. The results suggest that even the thought that the elderly individual or his/her relatives may get sick increases the level of health anxiety in the elderly population, consequently affecting their compliance with treatment. These results are consistent with the literature (Altın, 2020; Dymecka et al., 2021).

In the present study, the HAS scores of the elderly participants who experienced a severe fear of COVID-19 as well as of death and loss due to COVID-19 were higher than those who did not experience such fear. Furthermore, the elderly participants who experienced the fear of death and loss had higher MMTCS knowledge level sub-dimension scores. It was observed that the fear of sickness, death and loss due to COVID-19 significantly affect the elderly. From the results of the present study, it can be concluded that this fear of death and loss leads to an increased health anxiety and disease perception in elderly individuals. Erdoğdu et al. (2020) reported that 16.4% and 7.9% of the elderly population experienced moderate and severe anxiety, respectively. Li et al. (2020) reported that with the increase in the levels of anxiety, depression and anger during the COVID-19 pandemic, a decrease in positive feelings and the joys of life was observed in the elderly individuals as they began worrying more about their families and their health.

It was observed that the daily lives of the elderly individuals included in the study were affected by the COVID-19 pandemic. It was found that the HAS scores of those whose daily lives were affected were especially high than of those whose daily lives were not affected by the pandemic. The results showed that the daily lives of the elderly were highly affected during the pandemic, becoming more difficult due to the rise in their health anxiety levels, leading to difficulty in maintaining their treatment. Ağan (2020) reported that 61% of the study participants' daily lives were highly affected, and a study conducted in Hong Kong on elderly individuals stated that participants felt anxious and hopeless regarding the COVID-19 pandemic, which affected their daily lives and increased their health anxiety levels (Kwok et al., 2020).

The HAS and MMTCS knowledge level sub-dimension scores were higher among the participants whose treatments were affected by the COVID-19 pandemic than of those whose treatments remained unaffected. In addition, the DPS-SF scores of the elderly individuals whose treatments were not affected by the COVID-19 pandemic were higher compared with the rest of the participants. These results further showed that COVID-19 caused physical and psychological problems in the elderly individuals, making it difficult for them to comply with the treatment of their comorbidities. It can be deduced that the treatment compliance of the elderly individuals decreases especially as health anxiety levels increase. Even in cases where in COVID-19 does not affect the treatment of the elderly individuals, an increase in disease perception has been observed over the course of the pandemic. Altın (2020) stated that curfews imposed on the elderly population to protect their health and the consequent prolonged stay at home produce negative effects on their psychological and physical health.

In the present study, the HAS, DPS-SF and MMTCS motivation and knowledge level sub-dimension scores were higher among the elderly individuals whose sleep patterns were affected by the pandemic than among those with unaffected sleep patterns. As the results demonstrated, insomnia greatly affected the health anxiety, disease perception and treatment compliance of the elderly individuals. Altın (2020) stated that there was an increase in the incidence of insomnia and associated problems among the individuals who received a probable or definitive COVID-19 diagnosis.

The HAS, DPS-SF and MMTCS motivation sub-dimension scores were higher among the participants who were more cautious regarding their health during the COVID-19 pandemic compared with the rest of the participants. These results reveal that the development of health anxiety among the elderly is caused by a significant perceived threat to their well-being. In addition, the health-related perspectives, concerns and behaviors of the elderly also affect their disease perception. The results of this study indicate that elderly individuals experience anxiety concerning the prognosis of their diseases.

Conclusion and recommendations

The COVID-19 pandemic has significantly affected all elderly individuals. The present study demonstrated that the health anxiety and disease perception experienced by the elderly population during the COVID-19 pandemic were high, subsequently making it difficult for them to comply with treatment. In particular, the fear of death/loss, loss of loved ones, negative news regarding the elderly population in the media and restrictions imposed on them greatly affected the level of their health anxiety. Therefore, suitable health policies need to be developed for the elderly individuals who are vulnerable to outbreaks and epidemics, cooperation with professionals for health, treatment and care needs of the elderly individuals should be improved and at-home support should be provided to the elderly individuals in need of psychological support.

Limitations of research

Due to the COVID-19 pandemic, the data was collected via online questionnaires (Google Forms) instead of in person interviews. The data collection step took approximately 5 months. Since the target population of the study was elderly individuals, the differences in their education level and lack of or difficulty in using smartphones and social media, such as WhatsApp, constituted the limitations of the study.

CRediT authorship contribution statement

The conception and design of the study: **ÜV**, **NA**; acquisition of data: **ÜV**, **NA**; analysis and interpretation of data: **ÜV**, **NA**; drafting the article or revising it critically for important intellectual content: **ÜV**, **NA**; final approval of the version to be submitted: **ÜV**, **NA**

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