İstanbul Med J 2024; 25(1): 12-20
**DOI:** 10.4274/imj.galenos.2024.44420

# Investigation of the Relationship between COVID-19-Induced Dysfunctional Anxiety and Health Literacy in Oncology Patients

Eylem Topbaş[1], Ender Doğan[2]

[1]Amasya University Faculty of Health Sciences, Department of Nursing, Division of Internal Medicine Nursing, Amasya, Turkey
[2]Amasya University, Sabuncuoğlu Şerefeddin Training and Research Hospital, Department of Oncology, Amasya, Turkey

## ABSTRACT

**Introduction:** Improvement of health literacy plays a primary role in improving individual and public health. This study aimed to investigate the relationship between coronavirus disease-2019 (COVID-19)-induced dysfunctional anxiety and health literacy in oncology patients and the factors affecting this relationship.

**Methods:** This study has a descriptive, correlational, and cross-sectional design. Data were collected using a Personal Information Form, Turkey Health Literacy Scale, and Coronavirus Anxiety Scale-Short Form (CAS-SF).

**Results:** The mean age of the patients was 60.68±13.04; their mean total health literacy score was 26.73±12.44; the mean coronavirus anxiety score was 0.98±1.99. There was no significant correlation between the health literacy score and the CAS score ($p>0.05$). There was a significant negative correlation between health literacy and age ($p<0.001$). There was a statistically significant difference between the presence of comorbidities and educational status, and health literacy ($p<0.05$).

**Conclusion:** Because cancer patients with limited levels of health literacy may disrupt their treatment plans in stressful conditions such as pandemics, patients' levels of health literacy should be primarily determined when considering their treatment needs and overall care to ensure that this continues effectively. Training materials and contents should be prepared by considering the patient's age, education level, and comorbidities, as well as the general characteristics of the factor causing the pandemic.

**Keywords:** COVID-19, health literacy, dysfunctional anxiety, nursing, oncology

## Introduction

One in every 4-5 people is diagnosed with cancer in Turkey and all over the world (1). The change in priorities in terms of treatment and diagnosis in hospitals during the coronavirus disease-2019 (COVID-19) process and the rapid increase in the hospital occupancy rate caused delays in the diagnosis and treatment of cancer. This also caused difficulties in determining the incidence and mortality rates of cancer (2). Moreover, patients experienced stress, anxiety, and concerns because all hospitals had to allocate most of their capacity to COVID-19 cases during the pandemic process, the lack of treatment protocols for cancer patients in the early stages of the pandemic, the uncertainties about patient prioritization and the scope of treatment, and the various risks to be encountered if the treatment is delayed or is unable to continue (3). The recognition of COVID-19 as a pandemic, difficulties in its treatment, rate of transmission, and the severe and deadly disease process have caused panic all over the world. Increased COVID-19 cases and death rates reported in the media, pandemic measures, and unfounded news in the press and social media have led to an increase in fear, panic, anger, the feeling of uncertainty, depression, anxiety, loneliness, and even post-traumatic stress disorder in those who had the disease (4-8). Although cancer patients are used to hygiene rules in cancer treatment, the change in the diagnosis and treatment priorities of the health system during the pandemic, as well as the anxiety and concerns regarding having COVID-19 during treatment and infecting their loved ones, have raised the rates of loneliness and depression by 4.5 times (9). According to a comparison between cancer patients and other patient groups coming to medical examinations, the reason for cancer patients taking stricter protective measures in handwashing and compliance with social distance rules is the fear of getting COVID-19 (with the associated impact on their disease and treatment) and the subjective level of knowledge about COVID-19 (10).

Patients' reluctance to attend official health institutions at the beginning of the pandemic, social distance rules, and the call of social media and health institutions not to attend hospitals unless necessary have led

**Address for Correspondence:** Eylem Topbaş MD, Amasya University Faculty of Health Sciences, Department of Nursing, Division of Internal Medicine Nursing, Amasya, Turkey
**Phone:** +90 358 218 17 67 **E-mail:** eylem.topbas@gmail.com **ORCID ID:** orcid.org/0000-0002-9979-4722

**Cite this article as:** Topbaş E, Doğan E. Investigation of the Relationship between COVID-19-Induced Dysfunctional Anxiety and Health Literacy in Oncology Patients. İstanbul Med J 2024; 25(1): 12-20.

**Received:** 21.12.2023
**Accepted:** 19.01.2024

patients to prefer social media as a source of information (11). Experiencing the pandemic for the first time has caused confusion with the constantly and rapidly changing flow of information on the spread and course of the virus. The internet has been the most commonly used method to search for and access information on COVID-19 (12,13). However, a large portion of internet users may not have the skills to assess the quality and reliability of health information themselves (14). Due to this rapid flow of information, the pandemic has also created an "infodemic", in which such huge volumes of widely spreading information create much that can be false or misleading, making it difficult to determine what is accurate and what is not. Worldwide health literacy is necessary to resist the indemic and allow individuals to trust and act on reliable information and recommendations (14). If the individual can access basic health information by choosing reliable sources and can interpret and use it, it can be said that the one has health literacy (15). The Centers for Disease Control and Prevention (16) aimed to include organizations, professionals, policymakers, individuals, families, and communities in the national plan of action for health literacy development. Training materials, posters, infographics, social media, media organizations, individual counseling services, and educational institutions are used to improve health literacy. Improvement of health literacy plays a primary role in improving individual and public health.

It has been reported that the level of health literacy is low in seven out of 10 people in the general population in Turkey and that the incidence of chronic diseases increases as health literacy decreases (17). In addition, in our country and worldwide, cancer is the second leading cause of death after cardiovascular diseases. One out of every six deaths globally and one out of every five deaths in our country is due to cancer. Insufficient levels of health literacy also cause disruptions in preventive health services. Individuals with insufficient levels of health literacy are less likely to apply to cancer screening programs, leading to negative consequences in terms of both the improvement of an individual and social health, as well as increased costs (18). Therefore, the aim of this study was to examine the relationship between dysfunctional anxiety, which develops during the pandemic process due to the increasing number of cancer cases and the rapid spread of COVID-19, and health literacy throughout Turkey, along with the factors that affect this relationship. Dysfunctional anxiety is defined as anxiety to which we cannot respond accurately or interpret effectively. It is thought that this study will contribute to this field as no similar studies have been found in the literature so far.

## Methods

### Research Type

This study has a descriptive, correlational, and cross-sectional design.

### Research Place and Time

The study was conducted with patients who applied to the oncology outpatient clinic and chemotherapy unit of Amasya University Sabuncuoğlu Şerefeddin Training and Research Hospital between July 10, 2020 and November 01, 2021. The first normalization process of the COVID-19 pandemic started on January 06, 2020 in Turkey. This new period is called "restricted socialization."

### Research Population and Sample

Considering a correlation of 0.352 between the worry and anxiety scores of patients with diabetes mellitus and the health literacy mean scores of adults in the study conducted by Beyoğlu and Avcı (19), we planned to include 82 cases with a confidence interval of 95% (1-$\alpha$), a test power of 95% (1-$\beta$), and an effect size of $\rho$=0.352. Considering possible data losses and survey errors, the study was completed with 100 patients. Patients aged over 18 years, who were at least primary school graduates, who had no previously diagnosed psychiatric problems, and who were willing to participate in the study were included.

### Data Collection Method

Data were collected using a "Personal Information Form", the "Turkey Health Literacy Scale-32 (THLS-32)" and the "Coronavirus Anxiety Scale-Short Form (CAS-SF)." Questionnaires were completed in 10-15 minutes in one-on-one interviews.

### Data Collection Tools

**Personal Information Form:** This form consisted of 25 questions regarding the socio-demographic, disease-related, and COVID-19-related characteristics of the participants.

**Coronavirus Anxiety Scale-Short Form (CAS-SF):** This scale was developed by Lee (20) as a brief mental health screening tool to identify possible cases of COVID-19-related dysfunctional anxiety. The Turkish validity and reliability of the scale were established by Biçer et al. (21). It consists of five-point Likert-type questions and one dimension and is scored as "0-never", "1-rarely, less than one or two days", "2-a few days", "3-more than seven days", and "4-almost every day in the last two weeks." The highest score obtainable from the scale is 20, and scores of nine and above indicate a high level of anxiety. The Cronbach's alpha value of the original version of the scale was 0.93 (20). The Cronbach's alpha value was 0.83 in the study of Biçer et al. (21), whereas it was found to be 0.80 in our study.

**Turkey Health Literacy Scale-32 (THLS-32):** The scale was developed by Okyay et al. (22) in 2016 based on the "European Health Literacy Survey (HLS-EU)" and its validity and reliability study was conducted. Unlike HLS-EU, THLS-32 has a 2x4 matrix structure instead of a 3x4 matrix structure and consists of 32 questions. Accordingly, it consists of eight components in total: the two dimensions are "protection from diseases/health promotion and treatment/service" and the four processes are "access to health information, understanding health information, appraisal of health information, and applying/using health information" (22). The Cronbach's alpha value was 0.92 in the study of Okyay et al. (22), whereas it was found to be 0.94 in our study.

According to the index score obtained, the level of health literacy is classified into the following four categories:

(0-24.99) points: insufficient health literacy,

(25-32.99) points: problematic-limited health literacy,

(33-41.99) points: sufficient health literacy,

(42-50) points: excellent health literacy.

### Ethical Consideration

Ethics committee approvals were obtained from the Amasya University Non-Interventional Clinical Research Ethics Committee (approval number: 15386878-044 July 03, 2020-13312 and E-15386878-044-32314 September 13, 2021-32314). In addition, written permission was obtained from the Turkish Ministry of Health Scientific Research Platform (-2020-06-10T18_35_08). Written informed consent was also obtained from the participants of the study. The Declaration of Helsinki was adhered to throughout.

### Statistical Analysis

The data were analyzed using the Statistical Package for the Social Sciences 22 (IBM SPSS Corp., Armonk, NY, USA) program. Due to the non-normal distribution of the data, the Mann-Whitney U test was used in paired comparisons and the Kruskal-Wallis H test was used for comparisons between three or more groups. Spearman correlation analysis was used to determine the correlations between the scale scores. The relationship between categorical data was tested using chi-square analysis. The descriptive statistical method was used to evaluate the study data. The significance level was set at 0.05.

## Results

### Demographic and Disease-Specific Characteristics of Patients

The mean age of the patients was 60.68±13.04 (minimum-maximum: 20-83). Of these, 59% were female; 89% were married; 71% lived with their spouses and children; 43% had been diagnosed with cancer 3-6 months ago; and 51% had no comorbidities (Table 1). Of the patients, 72% were not diagnosed with COVID-19, whereas 91% followed the warnings about COVID-19 (Table 2).

### Distribution of THLS-32 and CAS-SF Scores and the Relationship between Them

The patients' total health literacy score was 26.73±12.44 (minimum-maximum: 0.00-47.89); the coronavirus anxiety score was 0.98±1.99 (minimum-maximum: 0.00-14.00); 33% of the patients had insufficient health literacy (12.19±8.98; minimum-maximum: 0.0-25); 39% had problematic-limited health literacy (29.90±2.89; minimum-maximum: 24-33); 21% had sufficient health literacy (37.36±2.28; minimum-maximum: 33-42); and 7% had excellent health literacy (45.81±2.06; minimum-maximum: 42-48). There was no significant correlation between health literacy and coronavirus anxiety total scores ($r=-0.079$; $p>0.05$). There was no significant difference between health literacy classifications and CAS scores ($H=0.657$; $p>0.05$).

### Comparison of Socio-Demographic and Disease-Specific Characteristics with Health Literacy and Coronavirus Anxiety Levels

There was no significant difference when the patients' sex, marital status, employment status, and financial status and their total scores on CAS-SF and THLS-32 were compared ($p>0.05$). While there was a significant difference between the education status, presence of comorbidities, and health literacy score ($p<0.05$), there was no significant difference between these characteristics and the total CAS-SF score ($p>0.05$). Patients with high levels of education and no comorbidities scored higher on health literacy and lower on coronavirus anxiety, whereas those with additional chronic diseases had higher anxiety scores (Table 3). The levels of health literacy of those whose income exceeded expenses, those who had been diagnosed with cancer 37 months ago or

**Table 1. Distribution of patients according to demographic and disease characteristics (n=100)**

| Variables | n | % |
|---|---|---|
| **Gender** | | |
| Female | 59 | 59.00 |
| Male | 41 | 41.00 |
| **Marital status** | | |
| Married | 89 | 89.00 |
| Single | 11 | 11.00 |
| **Education status** | | |
| Primary school | 73 | 73.00 |
| Middle school and above | 27 | 27.00 |
| **Employment status** | | |
| Employed | 19 | 19.0 |
| Unemployed | 81 | 81.0 |
| **Income status** | | |
| Income < expenses | 35 | 35.0 |
| Income = expenses | 58 | 58.0 |
| Income > expenses | 7 | 7.0 |
| **Social security** | | |
| Yes | 5 | 5.0 |
| No | 95 | 95.0 |
| **Cohabitants** | | |
| Alone | 7 | 7.0 |
| Nuclear family (spouse and/or children) | 71 | 71.0 |
| Extended family (spouse, children, family elders) | 13 | 13.0 |
| Other | 9 | 9.0 |
| **Cancer diagnosis** | | |
| Unspecified | 19 | 19.0 |
| Respiratory system (lung) | 9 | 9.0 |
| Gastrointestinal system (stomach, liver, colon) | 25 | 25.0 |
| Urinary system (prostate, bladder) | 9 | 9.0 |
| Endocrine system (pancreas, ovaries) | 15 | 15.0 |
| Breast | 23 | 23.0 |
| **Time of the first cancer diagnosis** | | |
| 3-6 months ago | 43 | 43.0 |
| 7-12 months ago | 24 | 24.0 |
| 13-24 months ago | 7 | 7.0 |
| 25-36 months ago | 13 | 13.0 |
| 37 months ago and earlier | 13 | 13.0 |
| **Chemotherapy status** | | |
| Yes | 92 | 92.0 |
| No | 8 | 8.0 |
| **Presence of comorbidities** | | |
| Yes | 49 | 49.0 |
| No | 51 | 51.0 |

| Table 2. COVID-19-related descriptive characteristics of patients (n=100) | | |
|---|---|---|
| **Variables** | **n** | **%** |
| **Diagnosis of COVID-19** | | |
| Yes | 28 | 28.0 |
| No | 72 | 72.0 |
| **Admission to hospital because of the suspicion of COVID-19** | | |
| Yes | 39 | 39.0 |
| No | 61 | 61.0 |
| **Diagnosis of a relative with COVID-19** | | |
| Yes | 50 | 50.0 |
| No | 50 | 50.0 |
| **Admission of a relative to the hospital because of suspicion of COVID-19** | | |
| Yes | 59 | 59.0 |
| No | 41 | 41.0 |
| **Status of watching news about COVID-19** | | |
| Yes | 92 | 92.0 |
| No | 8 | 8.0 |
| **Sources of information on COVID-19** | | |
| The website of the Ministry of Health and its instructions | 21 | 21.0 |
| TV, radio, and internet news | 75 | 75.0 |
| From the statements of the health personnel | 1 | 1.0 |
| Social media (Twitter, Instagram, Facebook, etc.) | 3 | 3.0 |
| **Training method preferred for instruction on COVID-19** | | |
| Social media training | 21 | 21.0 |
| Various videos distributed by phone | 16 | 16.0 |
| Distribution of brochures and posters | 8 | 8.0 |
| Oral presentation | 47 | 47.0 |
| Nothing interests me | 8 | 8.0 |
| **Paying attention to warnings regarding COVID-19** | | |
| Yes | 91 | 91.0 |
| No | 9 | 9.0 |
| **Delaying medical examinations due to COVID-19** | | |
| Yes | 23 | 23.0 |
| No | 77 | 77.0 |
| **Status of being affected by the treatment process when COVID-19 first appeared** | | |
| Not going to the hospital unless necessary when it first appeared | 80 | 80.0 |
| Not going to the health institution despite the need when it first appeared | 10 | 10.0 |
| Preferring telephone support from physicians and nurses | 9 | 9.0 |
| Benefiting from herbal mixtures that one knows or is recommended | 1 | 1.0 |
| **Changes in the patient's life due to the COVID-19 process*** | | |
| Leave treatment incomplete | 90 | 90.0 |
| Not wanting to go to the hospital | 41 | 41.0 |
| Fear of getting the virus | 67 | 67.0 |
| Fear of catching the virus every time I go to the hospital | 41 | 41.0 |
| Psychological state being negatively affected by being away from loved ones | 27 | 27.0 |
| Starting to be afraid of being in the same environment as other people | 51 | 51.0 |
| Fear of death | 22 | 22.0 |
| Starting to follow social media more | 11 | 11.0 |
| Starting to have obsessions with handwashing because of constant worry | 14 | 14.0 |
| Being tired/hating washing hands and wearing masks | 13 | 13.0 |
| Concern for the future | 6 | 6.0 |
| **The status of going to the health institution easily as the normalization process has started** | | |
| Yes | 63 | 63.0 |
| No | 3 | 3.0 |
| Does not go anyway unless necessary | 34 | 34.0 |

*Patients marked with multiple options, COVID-19: Coronavirus disease-2019

**Table 3. Comparison of health literacy and coronavirus anxiety levels with socio-demographic and disease-specific characteristics**

| | | Total Score of the Health Literacy Scale | | Total Score of the Coronavirus Anxiety Scale | |
|---|---|---|---|---|---|
| | | X ± SD | Min.-max. | X ± SD | Min.-max. |
| Gender | Female | 26.72±13.05 | 0.00-47.89 | 0.83±1.53 | 0.00-7.00 |
| | Male | 26.75±11.65 | 0.00-45.81 | 1.20±2.52 | 0.00-14.00 |
| Test statistics | | U=1183; p=0.853 | | U=1138.5; p=0.551 | |
| Marital status | Married | 26.67±12.10 | 0.00-47.89 | 1.07±2.09 | 0.00-14.00 |
| | Single | 27.26±15.56 | 2.08-47.89 | 0.27±0.65 | 0.00-2.00 |
| Test statistics | | U=429.5; p=0.508 | | U=392.5; p=0.201 | |
| Education status | Primary school | 25.48±11.95 | 0.00-47.89 | 1.08±2.23 | 0.00-14.00 |
| | Middle school and over | 30.12±13.31 | 2.08-47.89 | 0.70±1.14 | 0.00-4.00 |
| Test statistics | | U=710.5; **p=0.033** | | U=980.5; p=0.963 | |
| Employment status | Employed | 29.15±13.02 | 7.28-47.37 | 0.84±1.07 | 0.00-3.00 |
| | Unemployed | 26.17±12.31 | 0.00-47.89 | 1.01±2.16 | 0.00-14.00 |
| Test statistics | | U=648; p=0.286 | | U=682; p=0.357 | |
| Income status | Income < expenses | 26.09±13.12 | 0.00-47.89 | 0.46±0.92 | 0.00-4.00 |
| | Income = expenses | 26.71±12.43 | 0.00-47.89 | 1.33±12.45 | 0.00-14.00 |
| | Income > expenses | 35.17±3.25 | 30.71-40.60 | 0.71±0.95 | 0.00-2.00 |
| Test statistics | | U=5.124; p=0.077 | | U=2.444; p=0.295 | |
| Presence of comorbidities | Yes | 24.31±13.02 | 0.00-47.89 | 1.22±2.43 | 0.00-14.00 |
| | No | 29.07±11.49 | 0.00-47.89 | 0.75±1.44 | 0.00-7.00 |
| Test statistics | | U=950.5; **p=0.039** | | U=1111; p=0.253 | |
| Time of the first cancer diagnosis | 3-6 months ago | 25.78±13.35 | 0.00-47.89 | 0.88±1.73 | 0.00-7.00 |
| | 7-12 months ago | 27.89±10.05 | 4.68-47.89 | 1.46±2.92 | 0.00-14.00 |
| | 13-24 months ago | 26.18±14.03 | 0.00-40.60 | 0.86±1.21 | 0.00-3.00 |
| | 25-36 months ago | 26.43±13.59 | 1.56-47.37 | 0.92±1.55 | 0.00-5.00 |
| | 37 months ago and earlier | 28.35±12.89 | 0.00-42.69 | 0.54±1.45 | 0.00-5.00 |
| Test statistics | | U=0.927; p=0.921 | | U=3.365; p=0.499 | |
| Chemotherapy status | Yes | 26.95±12.32 | 0.00-47.89 | 0.97±2.02 | 0.00-14.00 |
| | No | 24.21±14.38 | 0.00-39.56 | 1.13±1.73 | 0.00-5.00 |
| Test statistics | | U=344.5; p=0.765 | | U=315.5; p=0.424 | |

SD: Standard deviation, Min.: Minimum, Max.: Maximum

earlier, and those who continued to receive chemotherapy were higher; however, there was no statistically significant difference between them. The coronavirus anxiety scores of patients who were married, were primary school graduates, were male, were unemployed, had comorbidities, were diagnosed with cancer 7-12 months ago, and did not receive chemotherapy were higher (Table 3).

There was no significant correlation between age and CAS-SF scores (r=0.104; p>0.05), whereas there was a negative and significant correlation between health literacy and age (r=-0.350; p<0.001). The level of health literacy of patients decreased as their age increased.

### Comparison of COVID-19-Related Variables with Levels of Health Literacy and Coronavirus Anxiety

The CAS-SF scores of patients who delayed their medical examinations because of COVID-19 were statistically significantly high (p<0.05) (Tablo 4). Even if there was no statistically significant difference, the coronavirus anxiety levels were high (p>0.05) amongst those who (or whose relatives) were diagnosed with COVID-19 and who (or whose relatives) attended the hospital because of the suspicion of COVID-19. The levels of health literacy of those who (and whose relatives) applied to the hospital due to COVID-19 and those whose relatives were diagnosed with COVID-19 were high, whereas the level of health literacy of those who were diagnosed with COVID-19 themselves was low (p>0.05) (Table 4).

## Discussion

Cancer diagnosis alone can cause feelings such as anxiety, worry, hypersensitivity, despair, and fear in patients. Although it was recommended to follow the isolation and hygiene rules that cancer patients are accustomed to, during the COVID-19 process, factors such as being away from loved ones, the absence of known drugs in the treatment of the disease, and the continuation of vaccine studies in the early stages of the pandemic all caused the patients to experience

**Table 4. Comparison of the levels of health literacy and coronavirus anxiety with variables related to COVID-19**

| | | Total Score of the Health Literacy Scale | | Total Score of the Coronavirus Anxiety Scale | |
|---|---|---|---|---|---|
| | | X ± SD | Min.-max. | X ± SD | Min.-max. |
| COVID-19 diagnosis | Yes | 26.68±13.04 | 0.00-47.37 | 1.32±2.96 | 0.00-14.00 |
| | No | 26.76±12.29 | 0.00-47.89 | 0.85±1.47 | 0.00-7.00 |
| Test statistics | | U=1002; p=0.963 | | U=990.0; p=0.872 | |
| Admission to the hospital because of suspicion of COVID-19 | Yes | 27.58±12.60 | 0.00-47.37 | 1.38±2.78 | 0.00-14.00 |
| | No | 26.20±12.40 | 0.00-12.40 | 0.72±1.23 | 0.00-5.00 |
| Test statistics | | U=1080; p=0.439 | | U=1129.5; p=0.612 | |
| Diagnosis of a relative with COVID-19 | Yes | 27.23±11.87 | 0.00-47.89 | 1.26±2.51 | 0.00-14.00 |
| | No | 26.23±13.08 | 0.00-47.89 | 0.70±1.27 | 0.00-5.00 |
| Test statistics | | U=1226.5; p=0.871 | | U=1147.0; p=0.397 | |
| Admission of a relative to the hospital because of suspicion of COVID-19 | Yes | 27.40±12.31 | 0.00-47.89 | 1.22±2.40 | 0.00-14.00 |
| | No | 25.77±12.71 | 0.00-47.89 | 0.63±1.13 | 0.00-4.00 |
| Test statistics | | U=1085.5; p=0.385 | | U=1100.5; p=0.360 | |
| Delaying medical examinations due to COVID-19 | Yes | 29.58±10.18 | 0.00-47.37 | 1.22±1.44 | 0.00-5.00 |
| | No | 25.88±12.97 | 0.00-47.89 | 0.91±2.13 | 0.00-14.00 |
| Test statistics | | U=741,5; p=0.238 | | **U=682; p=0.046** | |

COVID-19: Coronavirus disease-2019, SD: Standard deviation, Min.: Minimum, Max.: Maximum

anxiety, fear, and isolation (10,23). It is thought that the level of health literacy is important in coping with the effects of the pandemic, as the better the level of literacy, the better an individual will be at understanding the situation, making informed choices, and knowing what services to use.

In our study, it was determined that the levels of health literacy of the participants were low, that the majority had limited health literacy, and that the coronavirus anxiety scores were also low. Moreover, it was determined that the sources of information for 70% of the participants were television, radio, and internet news. Likewise, in a health literacy study conducted on the general population in Turkey, it was found that health literacy was low (17). Nguyen et al. (24) stated that one-third of cancer patients had limited health literacy, which resulted in more hospitalizations and emergency room visits. It was reported that health literacy in cancer patients (25) and in the general population (26) was low and that it was at a problematic level at a rate of 50.1% (27) during the COVID-19 pandemic.

The differences in national and international preventive and curative health policies followed during the pandemic process, the constant change in mortality and morbidity data, and the constant change of information about how the effects of the pandemic on hospital workload, the economy, education, and social life have affected the health literacy of health professionals and society as a whole, have made it difficult to track information (14). Good health literacy is of great importance to raise social awareness and take appropriate actions, especially in events that closely concern the health of all communities. Our findings showed that there was a need for actions and policies to improve health literacy in Turkey both before and during the pandemic (17). Furthermore, the development of reliable sources of information in multiple languages to combat the pandemic effectively will undoubtedly be valuable in the future success and control of the fight against the pandemic. In this regard, there is a need to determine the levels of health literacy of the whole of society, as understanding these levels will ensure that the information provided is as accessible and relevant to as broad a range of society as possible.

In our study, the coronavirus-related dysfunctional anxiety level of the patients was found to be low. This may be because the research process coincided with the process of life returning to normal. The initiation of vaccinations in Turkey at the time of the study and the consensus on measures for protection against the virus may have been effective. In addition, in our study, 90% of the participants left their treatment incomplete; 67% had a fear of getting the virus; 41% did not want to go to hospital; 51% began to be afraid of being in the same environment with other people; 14% started to have an obsession with washing hands; 13% got tired of washing hands and wearing masks and started to hate these restrictions. These can actually be considered as indicators of anxiety in individuals. In the literature, both during the pandemic and during the normalization process, the rate of anxiety due to coronavirus was reported to be 17.7% (28), 19.1% (29), 67.5% (30), and 47% (31); the rate of fear was 66% (29) and 62% (32). The differences in anxiety rates reported in the literature may be due to differences in measurement tools and the dates on which the studies were conducted. In their meta-analysis study, Ayubi et al. (33) emphasized that cancer patients experienced high levels of anxiety during the pandemic compared with normal healthy control groups and that depression was seen 60% more and anxiety was seen 30% more. Even after the first two waves of the pandemic, it was reported that the fear of getting COVID-19 was more dominant, especially in cancer patients who did not speak English and who used social media more frequently (32). The rapid spread of information to the larger masses due to technological developments

and the internet also causes the rapid spread of incorrect and correct information. The indemic has sabotaged vaccination efforts, causing fear and confusion (32). The knowledge and attitudes of individuals in the fight against an infectious disease can affect both individual and societal decision-making and change the course of the outbreak. Therefore, it is necessary to obtain information from reliable sources and thus improve social health literacy.

In our study, it was determined that education level and comorbidities were factors affecting health literacy. Patients with high levels of education and no comorbidities scored higher on health literacy and lower on coronavirus anxiety, whereas those with additional chronic diseases had higher anxiety scores. The higher the education level, the better the ability to access and synthesize information. In addition, the presence of comorbidities may have motivated individuals to reach for health-related information; thus, their health literacy levels were also high. Similarly, it has been reported in the literature that education level is an important factor affecting health literacy (13,15,26,30). Individuals with poor professional status, low income, and low education levels are less likely to access electronic sources of information and the internet. In this period, in which misinformation and rumors have spread and it has been difficult to distinguish between right and wrong, health professionals and policy implementers need to be more attentive and careful. Considering the limited resources and workforce, there is a need to determine the characteristics of society in the promotion and protection of health (15). A study conducted with adults in Australia showed that those with low health literacy had difficulty understanding COVID-19 symptoms, identifying protective behaviors against COVID-19, accessing information, and understanding messages (34). Health-related messages should be prepared to meet the needs of different groups; otherwise, they may pave the way for developing greater risks (34). In a study conducted in Saudi Arabia, it was stated that the public was afraid of COVID-19 more than average, which was associated with a low level of functional health literacy (26). Moussa et al. (26) stated that age, employment status, education level, and health literacy are predictors and important factors in the fear of COVID-19. Participants with higher levels of education performed better in using academic journals, filling out medical forms, and understanding and analyzing information (32).

While no significant correlation was determined between age and coronavirus anxiety scores in our study, there was a negative and significant correlation between health literacy and age and the level of health literacy decreased as age increased. In addition, the fact that the mean age of the study group was 60 and that 73% of the participants were primary school graduates can be associated with the difficulty in searching and accessing information, especially in following and synthesizing rapidly changing information during the pandemic. Technological confidence levels of individuals with advanced age and low health literacy are low (25). In a study conducted in Australia, it was determined that those aged 56-90 took the threat of COVID-19 more seriously than younger participants (34). Advanced age and low health literacy are both associated with a fear of COVID-19 (26).

In our study, the scores of patients who delayed their medical examinations on CAS-SF were high. This may be because patients were reluctant to go to the control examinations because of anxiety about getting the virus, and there was a high number of patients who said that they would not go to the hospital unless necessary. Similarly, in the literature, it was determined that cancer patients aged over 60 years in Turkey tended to postpone their tomography examinations more during the COVID-19 process and that they were worried about getting the virus (35).

In our study, it was observed that the level of health literacy was high in those who (and whose relatives) applied to the hospital because of COVID-19 and those whose relatives were diagnosed with COVID-19. This finding may be attributed to the fact that in cases of suspected COVID-19, and where their relatives got the virus, the participants obtained accurate information from health professionals, the process coincided with the normalization process, some information was clearer, and the same information was given everywhere, reducing the confusion.

In our study, the high level of health literacy in those who were diagnosed with cancer 37 months ago or earlier can be attributed to the fact that they met more frequently with health professionals, learned new information as time progressed, and developed compliance with the disease over time. Individuals with long-term chronic diseases can improve their health literacy skills and undergo medical examinations more regularly (36).

### Study Limitations

The fact that the study process coincided with the process of life returning to normal and that the findings could not be compared with those reported in the period when the number of active cases was higher can be considered as the limitations of the study.

## Conclusion

Because cancer patients with limited health literacy are at risk of disrupting their treatment plans during stressful processes such as pandemics, nurses should first determine patients' levels of health literacy. Age, education level, comorbidities, and the factor causing the pandemic should be considered while preparing training materials and content, and patients should be able to access accurate and reliable sources. Planning nursing initiatives that will increase health literacy is the key to a successful pandemic.

In conclusion, it was determined that cancer patients had limited health literacy and that those with advanced age, low education level, and comorbidities had even lower health literacy. Although no statistically significant difference was determined between them, the levels of health literacy of those who had an income that exceeded expenses, those who were diagnosed with cancer 37 months ago or earlier, and those who received chemotherapy treatment were higher. The results of this study can be used for a better understanding of the needs and concerns of cancer patients during the COVID-19 pandemic. They can also be used in healthcare planning and in foreseeing the concerns of patients receiving cancer treatment during potential future outbreaks of infectious diseases.

**Acknowledgements:** The authors would like to express their warm thanks to the patients who participated in this study.

**Ethics Committee Approval:** Ethics committee approvals were obtained from the Amasya University Non-Interventional Clinical Research Ethics Committee (approval number: 15386878-044 July 03, 2020-13312 and E-15386878-044-32314 September 13, 2021-32314).

**Informed Consent:** Written informed consent was also obtained from the participants of the study.

**Authorship Contributions:** Concept - E.T.; Design - E.T.; Data Collection or Processing - E.T., E.D.; Analysis or Interpretation - E.T., E.D.; Literature Search - E.T.; Writing - E.T., E.D.

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

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

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