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Death anxiety and death literacy among Turkish patients with chronic diseases: a cross-sectional study

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Abstract

Background Death anxiety is common in patients with chronic diseases. Death literacy is a novel theoretical framework that enables patients to discuss death, accept it as a natural aspect of life, and get a deeper comprehension of it. However, it is unclear whether there is a relationship between death literacy and death anxiety. Furthermore, death literacy has not been sufficiently researched in Turkish society. This study investigated the levels of death anxiety and death literacy among Turkish patients with chronic diseases and the factors affecting death anxiety.

Methods This was a cross-sectional study. The sample consisted of Turkish patients with chronic diseases ($n = 225$). The data were collected with the Turkish Death Anxiety Scale and the Death Literacy Index. Pearson correlation, independent samples t test, One-Way ANOVA, and multiple linear regression were employed to analyse the data.

Results There exists a negative moderate correlation between death anxiety and death literacy. It has been determined that the factors that most influence patients' fear of death are their level of death literacy and gender. These factors explained 12.8% of the variance in death anxiety ($R^2 = 0.128$, $F = 3.153$, $p < 0.001$).

Conclusions The results suggest that death literacy level and gender were found to be factors affecting death anxiety of patients. Women have higher death anxiety scores. While the level of death literacy of Turkish patients with chronic diseases increases, their death anxiety decreases. The findings of the study were believed to offer a comprehensive information for healthcare practitioners in the management of such patients.

Keywords Chronic disease, Cross-sectional, Death anxiety, Death literacy, Patient

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Introduction

The number of patients with chronic diseases is increasing worldwide due to factors that can include sedentary lifestyle, nutrition, and inappropriate environmental conditions [1, 2]. A total of 41 million people die every year due to some type of chronic disease, which is 74% of all deaths worldwide [2]. In Türkiye, there are 392.000 deaths each year due to chronic diseases, which corresponds to 88% of all deaths [3]. The fact that patients with life-threatening chronic diseases do not know their prognosis, think about mortality, and face the possibility of death at any moment causes them to experience death anxiety [4–7].

Death anxiety is a lifelong emotion that underlies all fears and develops after the realization that people will someday cease to exist and that they may lose themselves and the world. Emotions and thoughts such as the suffering experienced at the moment of death, ambiguity regarding the postmortem state, and the phenomenon of extinction itself can induce death fear [8]. Death anxiety is one of the most common consequences of chronic diseases [9]. A study conducted in Iran reported that 70% of patients with cardiovascular disease experienced moderate to severe death anxiety [10]. A study conducted in Türkiye found that hemodialysis patients had high death anxiety [11]. Another study conducted in Türkiye determined that the death anxiety level of diabetic patients was higher in women and those with primary school or lower education [12].

It is crucial for both individuals and societies to be able to discuss death, accept it as a natural part of life, and provide support for end-of-life transitions [13]. To this end, the concept of death literacy has emerged to help people better understand death in societies [14, 15]. Death literacy, which is a new concept in academia, is defined as the knowledge and skills people need to access, understand, and make informed decisions about death and end-of-life care options. Death literacy is measured by the Death Literacy Index (DLI) and has been found to be associated with some sociodemographic variables such as older age, having children, relationship status, religious status, and origin [16]. Studies on death literacy are limited in the literature [17, 18]. In Türkiye, no study has been found that determines the death literacy level of patients.

Understanding death and learning the unknowns about death are especially important in improving the quality of life of patients with life-threatening chronic diseases [19]. Since chronic diseases have no definitive cure and have serious complications, patients may experience death anxiety more intensely [10–12]. There is a negative relationship between health literacy and anxiety levels of patients with chronic diseases. It has been reported that patients with chronic diseases and low health literacy cannot manage their diseases on their own and have high anxiety levels [20]. There is also a negative relationship between death literacy and death anxiety [21, 22]. Higher death literacy is associated with lower levels of death anxiety [22]. We assume a negative relationship between death literacy and death anxiety in patients with chronic diseases. Additionally, we believe that death anxiety may be influenced by an individual's level of death literacy and sociodemographic characteristics. Additionally, death literacy has not been sufficiently researched in Turkish society. No studies examine the association of death anxiety and death literacy of patients with chronic diseases. There are many factors associated with death anxiety such as age, gender, religious beliefs and sociocultural [23–26]. Religious beliefs are regarded as a significant factor in shaping individuals' attitudes toward death anxiety. Among Muslims, belief in the afterlife affects death anxiety. This anxiety is believed to stem not from concern about the end of life, but rather from a sense of unpreparedness for the afterlife [27]. A study conducted in Pakistan reported that Muslims experience higher levels of death anxiety [25]. A study conducted in Turkey reported that death anxiety is high in elderly individuals with chronic diseases. It was also reported that gender is an important determinant of death anxiety and that women have higher death anxiety [26]. This could be a noteworthy oversight as determining the death literacy and death anxiety levels of patients with chronic diseases and the factors affecting death anxiety will guide patients in planning care to improve their quality of life. Consequently, this study was conducted to determine the levels of death anxiety and death literacy and the factors affecting death anxiety among Turkish patients with chronic diseases.

The study sought answers to the following questions: What is the level of death anxiety among Turkish patients with chronic diseases? What is the level of death literacy among Turkish patients with chronic diseases? Are there significant differences in death anxiety and death literacy levels among Turkish patients with chronic disease based on demographic variables (such as age, gender, and education level)? Is there a correlation between death literacy and death anxiety among Turkish patients with chronic diseases? What are the factors predicting death anxiety among Turkish patients with chronic diseases?

Materials and methods

Study design

This was a cross-sectional study.

Participants

The population of the study consisted of Turkish adults with chronic diseases living in the community in a city in the Eastern Black Sea region of Türkiye. The participants registered at the family health center in the city center

were contacted with the convenience sampling method and were included in the study.

Since there were no similar studies, a pilot study was conducted. The effect size obtained from the pilot study ($f^2 = 0.204$) was used for sample calculation. Based on the pilot study data, we used Cohen's f^2 calculation method to determine the effect size. Based on the results obtained in this pilot study, the effect size was calculated as $f^2 = 0.204$. This value is an effect size with sufficient power to obtain a significant result in our model with 9 independent variables. Using G*Power V. 3.1.9.7 program and data from a pilot study with 30 people, the number of cases to be included in the study was determined to be 201 with 99% confidence (1-α), 99% test power (1-β), $f^2 = 0.204$ effect size and 9 independent variables. The targeted sample size in our study was determined as 201 people. A total of 250 people were invited to participate in the study, and feedback was received from 225 participants who volunteered and fully completed the data collection tools. The response rate was 90%. The data of the pilot study were not included in this study. The participants were aged 18 years and over, had a clinically diagnosed chronic disease (such as hypertension, diabetes mellitus, cardiovascular system diseases, and respiratory system diseases) for six months and over, and had no communication problems.

Instruments

The data was collected using the Patient Information Form, Death Literacy Index (DLI) and Turkish Death Anxiety Scale (TDAS).

Patient information form

Prepared by the researchers, this form consisted of a total of 11 questions regarding the participants' age, gender, educational status, marital status, income, employment status, place of residence, chronic diseases (hypertension, diabetes mellitus, cardiovascular system diseases, respiratory system diseases), chronic disease duration, medication usage status and death of a relative [7, 23].

Death literacy index (DLI)

The DLI, developed (Leonard et al. 2022) and adapted into Turkish (Semerci et al., 2024), has 29 items on a 5-point scale [16, 28]. The sub-dimensions include "practical knowledge" (talking support 4 items-hands on care 4 items), "experiential knowledge" 5 items, "factual knowledge" 7 items and "social knowledge" (accessing help 5 items-community support groups 4 items). A high total score on the DLI indicates that individuals have a high "level of death literacy. Among Turkish individuals aged 18 and over, the Cronbach's alpha value of the adapted scale was 0.90; subscales were 0.68 talking support, 0.71 hands on care, 0.84 experiential knowledge, 0.90 factual knowledge, 0.90 accessing help and 0.89 community support groups [28]. In this study, the Cronbach alpha value of the scale was 0.90; for sub-dimensions were 0.77 talking support, 0.84 hands on care, 0.82 experiential knowledge, 0.91 factual knowledge, 0.91 accessing help and 0.90 community support groups.

Turkish death anxiety scale (TDAS)

The TDAS was developed [29], is 20 items on 5-point scale. The sub-dimensions include "uncertainty of death" 10 items, "exposure" 7 items, and "suffering" 3 items. The scale is scored between 0 and 80, with higher scores reflecting a more severe level of death anxiety. There are no reverse items in the scale. Among university students and adults, the Cronbach's alpha value of the scale was 0.95; subscales were 0.94 for uncertainty of death, 0.92 for exposure and 0.76 for suffering [29]. The Cronbach's alpha coefficient for the scale in this study was 0.95. The sub-dimensions were 0.91 for uncertainty of death, 0.92 for exposure, and 0.78 for pain.

Data collection

The study was conducted in a family health center determined by lot. The data were collected through face-to-face interviews between February and May of 2023 when the patients with chronic diseases applied to the family health center for a routine check-up and counseling. The study was carried out in accordance with the principles of the Declaration of Helsinki and with the written consent of the participants before the data collection tools were applied. Researchers distributed questionnaires to literate participants and read and recorded them to the illiterate participants. Each data collection form took approximately 15–20 min to complete.

Statistical analysis

International Business Machines (IBM) Statistical Package for the Social Sciences (SPSS) version 25.0 program (Armonk, NY: IBM Corp. 2022) was used for data analysis. In order to check the applicability of parametric tests, normality of the variables was assessed by skewness and kurtosis coefficients. The fact that these coefficients were between −3 and +3 indicated that the normality assumption was met [30]. This study employed descriptive statistics, Pearson correlation, independent samples t test, One-Way ANOVA, and multiple linear regression analysis to analyse the data. Independent samples t-test was used to evaluate whether there was a statistically significant difference between the two groups. One-Way ANOVA was used to determine whether there was a significant difference between more than two groups. These tests were used to test whether there were significant differences between demographic variables and variables such as death anxiety/death literacy. Pearson correlation analysis was used to examine whether there was a linear

Table 1 Comparison of DLI and TDAS scores with participants' descriptive characteristics

Characteristics	DLI	Practical knowledge	Experiential knowledge	Factual knowledge	Social knowledge	TDAS	Uncertainty of death	Exposure	Suffering
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Gender									
Female	86.09 (17.44)	19.21 (6.69)	19.25 (3.50)	18.92 (7.52)	28.71 (7.99)	40.87 (22.65)	21.14 (11.54)	13.42 (8.97)	6.30 (3.86)
Male	90.83 (19.51)	19.89 (6.69)	18.75 (3.86)	22.70 (7.38)	29.48 (7.62)	31.17 (20.16)	16.04 (10.39)	9.93 (7.82)	5.19 (3.48)
Test; p	-1.910; 0.057*	−0.750; 0.454*	1.004; 0.316*	-3.744; **<0.001***	−0.727; 0.468*	3.307; **0.001***	3.399; **0.001***	3.025; **0.003***	2.206; **0.028***
Education status									
Literate/ Primary school graduate	88.75 (16.95)	19.62 (7.07)	19.12 (3.12)	20.31 (7.72)	29.68 (7.10)	36.39 (21.82)	19.19 (10.96)	11.52 (8.49)	5.68 (3.91)
Secondary/ High school graduate	91.13 (16.13)	20.78 (6.56)	19.61 (3.67)	21.15 (6.86)	29.58 (7.36)	33.46 (22.46)	17.20 (11.68)	11.15 (8.87)	5.11 (3.84)
University or higher graduate	84.53 (21.56)	18.22 (6.10)	18.45 (4.21)	20.15 (8.32)	27.70 (9.00)	40.35 (22.08)	20.38 (11.49)	13.29 (8.71)	6.67 (3.30)
Test; p	2.222; 0.111**	2.440;0.089**	1.704; 0.184**	0.310; 0.734**	1.497; 0.226**	1.618; 0.201**	1.297; 0.275**	1.226;0.296**	3.025;0.051**
Marital status									
Married	89.92 (17.06)	19.49 (6.49)	19.29 (3.40)	21.33 (7.42)	29.80 (7.50)	36.15 (21.21)	18.82 (10.98)	11.62 (8.27)	5.71 (3.61)
Single	80.57 (21.77)	19.48 (7.49)	18.04 (4.43)	17.08 (7.84)	25.95 (8.42)	39.68 (25.57)	19.88 (12.77)	13.42 (10.09)	6.37 (4.23)
Test; p	3.101; **0.002***	0.005; 0.996*	1.766; 0.083*	3.396; **0.001***	2.996; **0.003***	−0.957; 0.339*	−0.563; 0.574*	-1.107;0.273*	−0.972; 0.335*
Income status									
Income less than expenses	87.94 (17.60)	20.30 (7.22)	19.05 (3.73)	19.61 (6.80)	28.96 (7.77)	37.86 (24.04)	19.25 (12.28)	12.63 (9.35)	5.98 (3.96)
Income equal to expenses	88.01 (18.73)	19.39 (6.60)	18.96 (3.76)	20.67 (8.06)	28.98 (7.81)	36.65 (22.40)	19.13 (11.40)	11.82 (8.75)	5.68 (3.85)
Income more than expenses	88.43 (18.97)	18.62 (6.22)	19.37 (3.07)	21.09 (7.40)	29.34 (8.26)	36.15 (17.94)	18.25 (9.63)	11.59 (7.24)	6.31 (2.82)
Test; p	0.008; 0.992**	0.670; 0.513**	0.163; 0.849**	0.474; 0.623**	0.030; 0.971**	0.075; 0.927**	0.091; 0.913**	0.200; 0.819**	0.405; 0.667**
Place of residence									
Urban	87.81 (18.05)	19.28 (6.48)	19.03 (3.75)	20.42 (7.49)	29.06 (7.79)	36.92 (22.44)	18.98 (11.60)	12.10 (8.64)	5.82 (3.73)
Rural	89.20 (20.29)	20.45 (7.56)	19.10 (3.19)	20.77 (8.60)	28.87 (8.11)	36.57 (20.94)	19.25 (10.16)	11.40 (8.89)	5.92 (3.84)
Test; p	−0.431; 0.667*	−0.997; 0.320*	−0.106; 0.916*	−0.259; 0.796*	0.139; 0.890*	0.090; 0.928*	−0.132; 0.895*	0.467; 0.641*	−0.150; 0.881*
Employment status									
Yes	84.85 (18.59)	18.62 (5.70)	18.31 (4.14)	19.95 (7.57)	27.95 (7.36)	36.59 (19.56)	18.78 (10.02)	11.95 (8.06)	5.85 (3.36)
No	89.62 (18.21)	19.92 (7.10)	19.40 (3.34)	20.74 (7.74)	29.55 (8.02)	36.99 (23.36)	19.15 (11.96)	11.99 (8.98)	5.84 (3.93)
Test; p	-1.836; 0.068*	-1.476;0.142*	-1.974;0.051*	−0.723; 0.471*	-1.440; 0.151*	−0.135; 0.893*	−0.247; 0.805*	−0.027; 0.978*	0.019; 0.985*
Chronic disease duration									
6 months-5 year	89.70 (18.54)	19.98 (7.04)	19.49 (3.95)	21.27 (7.54)	28.94 (7.43)	36.44 (24.94)	18.40 (12.32)	12.27 (9.77)	5.76 (4.27)
6–10 year	88.84 (17.60)	19.28 (6.52)	18.76 (3.55)	20.83 (6.92)	29.96 (7.23)	37.55 (21.30)	19.75 (11.06)	11.84 (8.13)	5.96 (3.54)
11 year or more	85.42 (19.15)	19.18 (6.54)	18.85 (3.43)	19.26 (8.51)	28.11 (8.81)	36.56 (19.98)	18.94 (10.62)	11.81 (8.06)	5.80 (3.38)
Test; p	1.102; 0.334**	0.321; 0.726**	0.893; 0.411**	1.379; 0.254**	1.035; 0.357**	0.058; 0.944**	0.275; 0.760**	0.065; 0.937**	0.058; 0.944**
Medication usage status									
Yes	89.27 (17.34)	19.38 (6.58)	19.01 (3.68)	21.07 (7.44)	29.79 (7.20)	35.46 (21.72)	18.50 (11.22)	11.28 (8.43)	5.67 (3.73)
No	82.90 (21.96)	19.95 (7.18)	19.16 (3.57)	18.00 (8.23)	25.79 (9.52)	42.79 (23.16)	21.30 (11.68)	14.93 (9.15)	6.55 (3.74)
Test; p	-1.775; 0.081*	0.501; 0.617*	0.235; 0.814*	-2.387; **0.018***	-2.589; **0.012***	1.965; 0.051*	1.461; 0.146*	2.507;**013***	1.392; 0.165*
Death of a relative									
Yes	90.85 (17.28)	20.17 (6.77)	19.70 (3.06)	21.12 (7.70)	29.84 (7.66)	34.20 (21.92)	18.07 (11.27)	10.74 (8.40)	5.38 (3.77)

Table 1 (continued)

Characteristics	DLI	Practical knowledge	Experiential knowledge	Factual knowledge	Social knowledge	TDAS	Uncertainty of death	Exposure	Suffering
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
No	83.45 (19.43)	18.37 (6.42)	17.95 (4.26)	19.43 (7.56)	27.69 (7.98)	41.23 (21.93)	20.61 (11.33)	14.02 (8.77)	6.60 (3.59)
Test; p	2.966; **0.003***	1.964; 0.051*	3.307; **0.001***	1.609; 0.109*	2.008; **0.046***	-2.331; **0.021***	-1.630; 0.104*	-2.792;**0.006***	-2.382;**0.018***

* Independent samples *t* test; **One-Way ANOVA; Statistically significant values ($p < 0.05$) are given in bold

relationship between the variables. This test was administered to assess whether there was a relationship between death anxiety and death literacy.

Prior to Multiple linear regression analysis (enter method), the dataset was tested for multicollinearity and autocorrelation (Variance Inflation Factor (VIF) < 10; Tolerance > 0.1; Durbin-Watson = 1.666). Multivariate normality assumptions were tested (Cook's distance < 1). Categorical variables were transformed into dummy variables to be used in regression analysis. For example, for categorical variables such as gender (male = 0, female = 1) and education level, a separate dummy variable was assigned to each category to ensure their inclusion in the analysis. In this study, the dependent variable is the score on the Death Anxiety Scale. The independent variables include age, gender, marital status, education level, income level, place of residence, employment status, duration of chronic disease, medication use, death of a relative, and the Death Literacy Scale score. Statistical significance level was accepted as $p < 0.05$. STROBE checklist was followed in the reporting of the study.

Ethical considerations

The study was approved by Bayburt University Ethics Committee (Approval No: 2023-01/16). Institutional permission was obtained from the family health center where the study was conducted. Permission to use the scales were obtained from the authors of the scales. The aim of the study was explained to the participants, and it was confirmed that their information would be kept confidential and that they could withdraw from the study at any time.

Results

Descriptive characteristics of the participants

The mean age of the patients with chronic diseases participating in the study was 49.68 (SD = 15.15) years (18–82 years). Among the participants, 58.7% were female, 41.8% were literate or primary school graduates, 80% were single, 67.1% were unemployed, 62.7% had an income equal to their expenses, and 82.2% lived in urban areas. Among the participants, 28% had hypertension, 20.4% had diabetes, 16.4% had cardiovascular disease, 7.6% had respiratory system diseases, and 27.6% had other conditions, including thyroid and rheumatological diseases. Additionally, 34.2% of the participants had a chronic disease duration of 6 months to 5 years, 34.2% had a duration of 6 to 10 years, 31.6% had a duration of 11 years or more, and 80.9% of the participants were using medication. 62.2% of the participants had experienced the death of a close relative.

Table 2 Distribution of participants' DLI and TDAS total scores

	Mean (SD)	Min - Max	Skewness	Kurtosis
DLI	**88.05 (18.43)**	**39–143**	**−0.265**	**0.092**
Practical knowledge	19.49 (6.69)	8–40	0.503	−0.050
Experiential knowledge	19.04 (3.65)	5–25	-1.086	2.008
Factual knowledge	20.48 (7.68)	7–35	−0.142	−0.907
Social knowledge	29.03 (7.83)	9–45	−0.511	0.162
TDAS	**36.86 (22.14)**	**0–80**	**0.277**	**−0.825**
Uncertainty of death	19.03 (11.34)	0–40	0.172	−0.929
Exposure	11.98 (8.67)	0–28	0.312	-1.018
Suffering	5.84 (3.74)	0–12	0.089	−0.954

DLI: Death Literacy Index; TDAS: Turkish Death Anxiety Scale

Comparison of DLI and TDAS scores with participants' descriptive characteristics

Statistically, the DLI total score of married patients who have experienced the death of a relative was significantly greater ($p < 0.05$). The TDAS total score of women and patients whose relatives did not die was statistically higher ($p < 0.05$). Additionally, men scored statistically higher on the factual knowledge subscale of the DLI, and those who were on medication scored statistically higher on both the factual knowledge and social knowledge subscales of the DLI. Those on medication had statistically lower scores on the Exposure and Suffering subscales of the TDAS (Table 1).

Distribution of participants' DLI and TDAS total scores

The mean DLI total score of the patients was 88.05 (SD = 18.43) and the mean TDAS score was 36.86 (SD = 22.14). In the study, death anxiety levels of the participants were close to slightly below moderate. Death literacy levels of the participants were close to slightly above moderate. The mean score for the practical knowledge sub-dimension of the DLI was 19.49 (SD = 6.69), the mean score for the experiential knowledge sub-dimension was 19.04 (SD = 3.65), the mean score for the factual knowledge sub-dimension was 20.48 (SD = 7.68), and the mean score for the social knowledge sub-dimension was 29.03 (SD = 7.83). The mean score of the TDAS uncertainty of death sub-dimension was 19.03 (SD = 11.34), the mean score of the Exposure sub-dimension was 11.98 (SD = 8.67), and the mean score of the suffering sub-dimension was 5.84 (SD = 3.74) (Table 2).

The Pearson correlation test indicated a negative correlation between DLI and TDAS (r = -0.276, $p < 0.001$).

The predictors of the total mean score of TDAS

In Table 3, the factors predicting patients' death anxiety were analyzed. Multiple linear regression analysis was performed to predict death anxiety alongside patients' death literacy level, gender, marital status, educational status, income status, place of residence, employment status and death of a relative variables. When the results were analyzed, it was determined that the model created was statistically significant (F = 3.153, $p < 0.001$). Among the variables included in the model, death literacy and gender variables were found to be statistically significant predictors of death anxiety ($p < 0.05$). Participants with higher levels of death literacy and women had higher death anxiety. The model explains 12.8% of the variance in death anxiety ($R^2 = 0.128$) (Table 3).

Table 3 The predictors of the total mean score of TDAS

Variable	Unstandardized Coefficients		Standardized Coefficients	t	*p*	95% CI	
	B	SE	β			Lower	Upper
(Constant)	62.223	8.497		7.323	0.000	45.474	78.972
DLI	**−0.291**	**0.080**	**−0.242**	**-3.623**	**0.000***	**−0.449**	**−0.133**
Gender (ref: Female)	**-8.109**	**3.094**	**−0.181**	**-2.621**	**0.009***	**-14.208**	**-2.011**
Marital status (ref: Married)	-3.362	3.916	−0.061	−0.859	0.392	-11.081	4.357
Education status (ref: Literate/Primary school graduate)							
Secondary/High school graduate	−0.008	3.779	0.000	−0.002	0.998	-7.457	7.441
University or higher graduate	5.242	4.521	0.110	1.159	0.248	-3.669	14.152
Income status (ref: Bad)							
Middle	-1.546	3.512	−0.034	−0.440	0.660	-8.468	5.375
Good	-1.210	5.001	−0.019	−0.242	0.809	-11.068	8.647
Place of residence (ref: Urban)	1.110	3.901	0.019	0.285	0.776	-6.579	8.798
Employment status (ref: Yes)	3.070	3.756	0.065	0.817	0.415	-4.333	10.473
Death of a relative (ref: Yes)	3.993	3.359	0.088	1.189	0.236	-2.629	10.614

Dependent Variable: TDAS

Abbreviations: DLI: Death Literacy Index; TDAS: Turkish Death Anxiety Scale; CI, confidence interval; SE, standard error; β, standardized regression coefficient

Notes: Durbin-Watson = 1.666; F = 3.153, df = 10; $p < 0.001$; $R = 0.358$; $R^2 = 0.128$; Adjusted $R^2 = 0.088$; * = $p < 0.05$

Discussion

Individuals with chronic diseases are more likely to experience life-threatening complications. Therefore, they are among the disadvantaged groups in terms of mortality risk [4]. The present study investigated the extent of death anxiety and death literacy among individuals diagnosed with chronic illnesses, as well as factors related to death anxiety.

Feelings related to uncertainty surrounding end-of-life possibilities and extinction are known to cause death anxiety in people [6]. The level of death anxiety shows individual, religious, social, and cultural differences [14, 25, 31]. In previous studies conducted with patients with chronic diseases, death anxiety levels were reported to be moderate and high [4, 6, 7, 23, 32–35]. A study conducted with Lebanese adults found that highly religious individuals experienced higher levels of death anxiety [31]. A study conducted in Pakistan reported that Muslims experienced more death anxiety compared to Christians. The higher levels of death anxiety experienced by Muslims may be linked to religious beliefs about life after death. The detailed description of the afterlife process in Islam, including burial, life in the grave, and the depiction of a punishing afterlife for sinners, may contribute to an increase in individuals' death anxiety [25]. In our study, death anxiety was found to be close to slightly above moderate. It is believed that this result may be due to the uncertainty surrounding death and the presence of a chronic disease.

The factors affecting death anxiety include sociodemographic, sociocultural, and personality characteristics of individuals [36]. In this study, only gender and death literacy were found to be predictors of death anxiety. This situation indicates that the explanatory power of the model in our study is limited, suggesting that death anxiety is influenced not only by specific individual characteristics but also by more complex and multifaceted factors. In this study, it was determined that the variables of patients' marital status, education level, income level, place of residence, employment status, and the death of a relative did not predict death anxiety. Many similar studies in the literature have shown that these variables are not associated with death anxiety [12, 37, 38].

It has also been reported that women with chronic diseases have higher death anxiety [6, 21, 22, 39]. On the other hand, other study results have indicated that gender had no effect on death anxiety [40, 41]. A systematic review and meta-analysis study results revealed that there were positive correlations of death anxiety with female sex [42]. Similarly, this study also found that gender is one of the factors affecting death anxiety, with women exhibiting higher levels of death anxiety compared to men. The fact that women take on roles such as mother and wife, constantly think about people other than themselves and are generally more emotional causes them to experience anxiety in all areas [24, 43]. The physiological predisposition of women to be more sensitive and emotional than men, together with their diverse social responsibilities, provides valuable understanding to the findings of our study.

The uncertainty of death, not having encountered death before and the feeling of nothingness increase death anxiety in patients [6]. In our study, patients who had not experienced the death of a relative had higher death anxiety. We believe that the absence of witnessing death through a family member, the absence of a grieving process, and the lack of awareness about death can contribute to increased death fear among patients whose relatives have survived their illness.

Understanding the concept of death and having relevant knowledge on the topic defines one's level of death literacy [14, 15]. Studies on death literacy, which is a new concept in the literature, are limited [38]. In a community study on death literacy in the United Kingdom, it was reported that the death literacy of the participants was close to the middle level [17, 44]. In another study conducted with Swedish adults, it was observed that the death literacy of the participants was intermediate level [17]. Similarly in this study, it was determined that the death literacy levels of the patients with chronic diseases were close to slightly above moderate level.

The factors such as culture, religious beliefs, social environment, and status affect people's emotional and cognitive coping with death and postmortem process [45, 46]. Should a close acquaintance pass away, there are several approaches to navigate the process in a manner that facilitates a deeper level of comprehension. These may encompass religious rituals aimed at paying tribute to the deceased, providing assistance to their families, and offering sympathy. In our study, it was observed that married patients and patients with a deceased relative had higher levels of death literacy. It is thought that the experiences of the participants related to death in their surroundings or families, religious and some cultural approaches to death and the postmortem process within their domestic responsibilities as married people were effective in our study results.

The uncertainty of death and the postmortem process causes an increase in death anxiety [14]. The findings of our present study indicate that death literacy is a significant determinant of death fear. Specifically, we noticed a negative correlation between death literacy and patients' death anxiety. Death literacy contributes to the elimination of the uncertainty about death and its aftermath and preparation for death [14, 15]. Death literacy increases patients' awareness of the topic and enables them to talk about and normalize it. This is thought to reduce death anxiety by psychologically relieving patients.

Although the findings of this study cannot be generalized to other countries, they emphasize the importance of considering death literacy and death anxiety in different countries and cultures. This study shows that health literacy regarding death and gender affect death anxiety in patients with chronic diseases in Turkish society. As the level of death literacy increases among patients with chronic diseases, their anxiety about death decreases. The findings of our study indicate that a multifaceted approach is required to address issues related to death anxiety and death literacy. Clinical practices should include multidisciplinary strategies aimed at reducing death anxiety and should address the psychological and informational needs of patients. It is suggested that more studies be conducted on different sample groups that address death literacy and death anxiety together. It is also recommended to conduct qualitative studies aimed at identifying women's high levels of death anxiety.

Limitations

There were several significant limitations in the present study. Firstly, this study used convenience sampling for the sampling selection. This may increase the possibility of bias. Secondly, the participants' death literacy and death anxiety were determined using scales completed by the researchers during face-to-face interviews. The data were based on self-reports of the participants and therefore, the results cannot be generalized. Thirdly, because of its cross-sectional design, the obtained results reflected the situation only in the data collection process. Another limitation was the lack of access to similar studies, which made it very difficult to compare and evaluate some of the findings. In addition, one of the limitations of our study is the low explanatory power of the model. This result highlights the need to explore other psychological, sociodemographic, health-related, and cultural variables that may influence death anxiety.

Conclusion

In conclusion, our study revealed that the levels of death anxiety and death literacy among patients with chronic diseases were close to slightly above moderate. In addition, death literacy level and gender were found to be the factors affecting death anxiety of the patients. While the level of death literacy of Turkish patients with chronic diseases increases, their death anxiety decreases. In addition, women have higher death anxiety scores. Considering that the concept of death is perceived emotionally by women, providing psychological counseling services may be beneficial. Based on the findings of our study, it is suggested that effective educational programs be organized for patients who need to increase their level of death literacy in order to reduce anxiety, facilitating the acquisition of knowledge about death and the post-death process. The results of this study emphasize the importance of death literacy in managing death anxiety in patients with chronic diseases. To increase death literacy in individuals with chronic diseases, it is crucial to enhance training for health professionals, implement patient-centered communication strategies, and organize awareness programs within health institutions. In addition, interdisciplinary collaboration can reduce death anxiety and make individuals more aware of end-of-life decisions. These approaches increase the quality of patient-centered care and provide more effective health services.

Abbreviations

DLI	Death Literacy Index
IBM	International Business Machines
SPSS	Statistical Package for the Social Sciences
TDAS	Turkish Death Anxiety Scale
VIF	Variance Inflation Factor

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Author contributions

V.S.Ç. wrote the first draft of the research. V.S.Ç, A.S. and E.S.S. carried out material preparation and data collection. V.S.Ç and E.S.S. performed the analysis. V.S.Ç, E.S.S. and A.S. wrote the main manuscript text. V.S.Ç, E.S.S. and A.S. read and approved the final manuscript. All authors contributed to the study conception and design.

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Data availability

The datasets generated and analysed during the current study are not publicly available due [It is not requested by researchers] but are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Bayburt University of Ethics Committee (Date:20.01.2023/No:16). Written/verbal informed consent was obtained from all participants or their legal guardians before enrollment.

Consent for publication

Not Applicable.

Competing interests

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References

1. Centers for Disease Control and Prevention. About chronic diseases. National Center for Chronic Disease Prevention and Health Promotion. 2022. https://www.cdc.gov/chronicdisease/about/index.htm Accessed 12 May 2023.
2. World Health Organization. Noncommunicable diseases 2022. https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases Accessed 28 May 2023.

3. World Health Organization. Noncommunicable diseases progress monitor 2017. https://apps.who.int/iris/bitstream/handle/10665/258940/9789241513029eng.pdf?sequence=1 Accessed 14 May 2023.
4. Cengiz Z, Yıldırım H, Gürdap Z. Meaning of life and death anxiety in ındividuals with chronic disease. Van Med J. 2021;28(3):348–53. https://doi.org/10.5505/vtd.2021.43650.
5. Hu SQ, Tang W, Zhang WQ, Chen HL, Shen WQ. Incidence of death anxiety in palliative care: A systematic review and meta-analysis. OMEGA-Journal Death Dying. 2022;00302228221104298. https://doi.org/10.1177/00302228221104298.
6. Tadi A, Gheibizadeh M, Anjiri SGC. Death anxiety and associated factors in the hospitalized and Non-hospitalized elderly with chronic diseases in Ahvaz. Jundishapur J Chronic Disease Care. 2022;11(4):e121525. https://doi.org/10.5812/jjcdc-121525.
7. Yıldırım D, Kocatepe V. Evaluating death anxiety and death depression levels among patients with acute myocardial infarction. OMEGA-Journal Death Dying. 2023;86(4):1402–14. https://doi.org/10.1177/00302228211009773.
8. Karahan FŞ, Hamarta E. The effect of chronic diseases and polypharmacy on anxiety and death anxiety in geriatric patients. Aegean J Med Sci. 2019;2(1):8–13. https://doi.org/10.33713/egetbd.463608.
9. Soleimani MA, Lehto RH, Negarandeh R, Bahrami N, Chan YH. Death anxiety and quality of life in Iranian caregivers of patients with cancer. Cancer Nurs. 2017;40(1):E1–10. https://doi.org/10.1097/NCC.0000000000000355.
10. Valikhani A, Yarmohammadi-Vasel M. The relationship between attachment styles and death anxiety among cardiovascular patients. J Kerman Univ Med Sci. 2014;21(4):355–67. https://jkmu.kmu.ac.ir/article_16205.html.
11. Yıldırım Üşenmez T, Demir Dikmen R. The effect of religious attitude on death anxiety among patients undergoing Hemodialysis treatment: A sample from Turkey. J Relig Health. 2024;63:2794–805. https://doi.org/10.1007/s10943-024-02042-3.
12. Doğan R, Arslantas D, Ünsal A. Assessment of depression and death anxiety level in diabetic patients in Eskisehir, Turkey. Int J Diabetes Developing Ctries. 2015;35:242–9.
13. Tieman J, Miller-Lewis L, Rawlings D, Parker D, Sanderson C. The contribution of a MOOC to community discussions around death and dying. BMC Palliat Care. 2018;17(31):1–16. https://doi.org/10.1186/s12904-018-0287-3.
14. Noonan K, Horsfall D, Leonard R, Rosenberg J. Developing death literacy. Progress Palliat Care. 2016;24(1):31–5. https://doi.org/10.1080/09699260.2015.1103498.
15. Leonard R, Noonan K, Horsfall D, Psychogios H, Kelly M, Rosenberg JP, Rumbold B, Grindrod A, Read N, Rahn A. Death literacy index: a report on its development and implementation. 2020. https://doi.org/10.26183/5eb8d3adb20b0
16. Leonard R, Noonan K, Horsfall D, Kelly M, Rosenberg JP, Grindrod A, Rumbold B, Rahn A. Developing a death literacy index. Death Stud. 2022;46(9):2110–22. https://doi.org/10.1080/07481187.2021.1894268.
17. Johansson T, Tishelman C, Eriksson LE, Cohen J, Goliath I. Factors associated with death literacy among Swedish adults: A cross-sectional exploratory study. Palliat Supportive Care Published Online 2023:1–11. https://doi.org/10.1017/S1478951523000548
18. Ng WI, Che SL, Li X, Zhu M. Association of filial attitude, filial behavior and death literacy: implications for development of death system in Guangdong-Hong Kong-Macao greater Bay area of China. BMC Public Health. 2024;24(1):721. https://doi.org/10.1186/s12889-024-18197-3.
19. Park S, Kim H, Jang MK, Kim H, Raszewski R, Doorenbos AZ. Community-based death Preparation and education: a scoping review. Death Stud. 2023;47(2):221–30. https://doi.org/10.1080/07481187.2022.2045524.
20. Yoon IJ, Lee SJ. Health literacy and anxiety among Hemodialysis patients during the coronavirus disease pandemic. Psychol Res Behav Manage. 2023;1051–61. https://doi.org/10.2147/PRBM.S395479.
21. Cybulska AM, Żołnowska MA, Schneider-Matyka D, Nowak M, Starczewska M, Grochans S, Cymbaluk-Płoska A. Analysis of nurses' attitudes toward patient death. Int J Environ Res Public Health. 2022;19(20):13119. https://doi.org/10.3390/ijerph192013119.
22. Zhang X, Zhang H, Zhu M, Wu M, Huang Y, Qin Z. The mediating effects of death reflection on death literacy and death anxiety among Chinese nurses: a cross-sectional study. Sci Rep. 2024;14(31153):1–8. https://doi.org/10.1038/s41598-024-82421-8.
23. Waheed-Elzohairy N, Alsaied Alfayomy N, I Hassan N. The relationship between death anxiety, spiritual well-being, and successful aging among community dwelling older adults. Int Egypt J Nurs Sci Res. 2022;3(1):272–85. https://doi.org/10.21608/ejnsr.2022.247080.
24. Gonçalves G, AL-Dossary SA, Sousa C. Measurement invariance and country difference in death anxiety: evidence from Portuguese and Arab samples. Curr Psychol. 2023;1–11. https://doi.org/10.1007/s12144-023-04659-1.
25. Husain W, Ammar A, Trabelsi K, et al. Development and validation of believers' death anxiety scale: integrating religious dimensions into death anxiety assessment. Discover Mental Health. 202;4(64):1–14. https://doi.org/10.1007/s44192-024-00120-2.
26. Karaman S, Bahçecioğlu Turan G, Çayır Yılmaz M, Yilmaz Karabulutlu E. Examination of elder abuse and death anxiety in older adults with a chronic disease. Nurs Open. 2025;12(1):e70092. https://doi.org/10.1002/nop2.70092.
27. Davoudi N. Remember death: an examination of death, mourning, and death anxiety within Islam. Open Theol. 2022;8(1):221–36. https://doi.org/10.1515/opth-2022-0205.
28. Semerci V, Sönmez Sari E, Seven A. Validity and reliability of the Turkish version of the death literacy index. OMEGA-Journal Death Dying. 2024;8(3):807–22. https://doi.org/10.1177/00302228221144672.
29. Sarıkaya Y, Baloğlu M. The development and psychometric properties of the Turkish death anxiety scale (TDAS). Death Stud. 2016;40(7):419–31. https://doi.org/10.1080/07481187.2016.1158752.
30. Kline RB. Methodology in the social sciences: principles and practice of structural equation modeling. Guilford Press; 2011.
31. Abou Jaoude J, Obeid S, Malaeb D, Sakr F, Dabbous M, El Khatib S, Hallit S, Fekih-Romdhane F, Hallit R. The moderating effect of religiosity between climate change anxiety and death anxiety among a sample of Lebanese adults. BMC Psychol. 2024;12(453):1–8. https://doi.org/10.1186/s40359-024-01942-z.
32. Bastani F, Farnood F, Haghani H. Evaluation of death anxiety in elderly patients with cancer undergoing chemotherapy. J Client-Centered Nurs Care. 2016;2(3):153–60. https://doi.org/10.32598/jccnc.2.3.153.
33. Dewina A, Emaliyawati E, Praptiwi A. Death anxiety level among patients with chronic renal failure undergoing Hemodialysis. J Nurs Care. 2018;1(1):1–7. https://doi.org/10.24198/jnc.v1i1.15757.
34. Nal B, Aydın Avcı I, Ayyildiz M. The correlation between death anxiety and anxiety in elderly with chronic obstructive pulmonary disease. Progress Health Sci. 2016;6:63–9. https://doi.org/10.5604/01.3001.0009.5111.
35. Togluk S, Çuhadar D. The effect of death anxiety on psychosocial adjustment in individual with chronic obstructive pulmonary disease. Indian J Palliat Care. 2021;27(3):358. https://doi.org/10.25259/IJPC_338_20.
36. Karakuş G, Öztürk Z, Tamam L. Death and death anxiety. Archives Med Rev J. 2012;21(1):42–79. https://dergipark.org.tr/tr/pub/aktd/issue/2213/29402.
37. Hong Y, Yuhan L, Youhui G, Zhanying W, Shili Z, Xiaoting H, Wenhuaet Y. Death anxiety among advanced cancer patients: a cross-sectional survey. Support Care Cancer. 2022;30:3531–39. https://doi.org/10.1007/s00520-022-06795-z.
38. Bayrak B, Oğuz S, Karabulut Z, Çelik S, Kodak C. Determination of death anxiety in heart failure patients. Turk J Cardiovasc Nurs. 2019;10(23):97–104. https://doi.org/10.5543/khd.2019.09226.
39. Batı S, Polat HT, Akkuş H. Determination of the relationship between self-care agency and death anxiety among elderly ındividuals. OMEGA-Journal Death Dying. 2022;00302228221095907. https://doi.org/10.1177/00302228221095907.
40. Top FÜ, Saraç A, Yaşar G. Depression, death anxiety and daily life functioning in the elderly living in nursing home. Turkish J Clin Psychiatry. 2010;13:14–22. https://jag.journalagent.com/kpd/pdfs/KPD_13_1_14_22.pdf.
41. Arpacı F, Avdaş E, Doğruöz Ö, Sarıdoğan T. A study into death anxiety at the elderly. Elder Issues Res J. 2011;4(1–2):53–66. https://dergipark.org.tr/tr/pub/yasad/issue/21794/234241.
42. Li Y, Dong W, Tang H, Guo X, Wu S, Lu G, Li X, Chen C. Correlates of death anxiety for patients with cancer: A systematic review and meta-analysis. J Clin Nurs. 2024;33(5):1933–47. https://doi.org/10.1111/jocn.17021.
43. Saleem T, Saleem S. Religiosity and death anxiety: A study of Muslim Dars attendees. J Relig Health. 2020;59:309–17. https://doi.org/10.1007/s10943-019-00783-0.
44. Graham-Wisener L, Toner P, Leonard R, Groarke JM. Psychometric validation of the death literacy index and benchmarking of death literacy level in a representative UK population sample. BMC Palliat Care. 2022;21(1):1–15. https://doi.org/10.1186/s12904-022-01032-0.
45. Hadi A. Near death experience Dalam perspektif Islam. Jurnal Dakwah Dan Komunikasi Islam. 2022;20(2):25–32. https://doi.org/10.59109/addawah.v20i2.28.
46. Pehlivanova M, Carroll A, Greyson B. Which near-death experience features are associated with reduced fear of death? Mortality. 2022;28(11):1–17. https://doi.org/10.1080/13576275.2021.2017868.

Publisher's note

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