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Anxiety and e-health literacy levels of patients scheduled for thoracic surgery

Ansiedad y alfabetización en salud electrónica de pacientes que se someterán a cirugía torácica

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Abstract

Objective: *This study was conducted to examine the relationship between the pre-operative anxiety levels of patients scheduled for thoracic surgery and their e-health literacy levels pertaining to skills such as finding and evaluating electronic health information about health problems.* **Methods:** *This study was a descriptive and correlational study. One hundred and two patients scheduled for thoracic surgery were interviewed in İzmir. The Amsterdam pre-operative anxiety and information scale (APAIS), the Visual Analog Scale for anxiety (VAS-A), the eHealth literacy scale (eHEALS), and a patient information form were used to collect data.* **Results:** *The mean VAS-A score of the patients was 6.02 ± 2.51, their mean APAIS score was 18.73 ± 5.85, and their mean eHEALS score was 24.84 ± 9.21. There was no significant relationship between the anxiety and e-health literacy levels of the patients. Significant differences were found in the e-health literacy levels of the patients according to their ages and reasons for surgery.* **Conclusion:** *Patients scheduled for thoracic surgery were determined to experience moderate anxiety and need moderate levels of information. The patients were also found to have moderate e-health literacy levels. There was no significant relationship between the anxiety and e-health literacy levels of the patients.*

Keywords: *Thoracic surgery. E-health literacy. Pre-operative anxiety.*

Resumen

Objetivo: *Examinar la relación entre los niveles de ansiedad pre-operatoria de los pacientes que se someterán a una cirugía torácica y la alfabetización en salud electrónica, como encontrar y evaluar información de salud electrónica sobre problemas de salud.* **Métodos:** *Estudio descriptivo y relacional. Para recopilar datos se utilizaron la Escala de Ansiedad e Información Pre-operatoria de Amsterdam (APAIS), la Escala de Ansiedad Analógica Visual (EVA-A) y la Escala de Alfabetización en E-salud, y un formulario de información descriptiva del paciente.* **Resultados:** *Según la EVA-A, los niveles de ansiedad de los pacientes fueron de 6.02 ± 2.51. La puntuación APAIS fue de 18.73 ± 5.85. La puntuación de la escala de alfabetización en salud electrónica de los pacientes fue de 24.84 ± 9.21. No hubo una relación significativa entre los niveles de ansiedad de los pacientes y su alfabetización en salud electrónica. Se encontró una diferencia significativa entre los niveles de alfabetización en salud electrónica de los pacientes según su edad y el motive de la cirugía.* **Conclusiones:** *Los pacientes que serán sometidos a cirugía torácica experimentan ansiedad moderada y se determinó que necesitan información moderada. También se descubrió que los pacientes tenían niveles moderados de conocimientos sobre cibersalud. No hubo una relación significativa entre la ansiedad y los niveles de alfabetización en salud electrónica de los pacientes.*

Palabras clave: *Cirugía torácica. Alfabetización en salud electronica. Ansiedad pre-operatoria.*

Introduction

Anxiety is an emotional response to stimuli that people perceive as threatening[1]. It is one of the most common psychological reactions in patients undergoing surgery and is seen in 80% of patients scheduled for high-risk surgery[2]. In the pre-operative period, patients face various situations that trigger anxiety[3]. Pre-operative anxiety seems to be due to reasons such as a lack of knowledge about surgery and anesthesia, complications that may develop due to surgery and anesthesia, and dependency on others after surgery. For these reasons, the pre-operative, intraoperative, and post-operative periods are worrisome for most patients and create pre-operative anxiety[4,5]. In a study examining the thoughts and wishes of patients who would undergo surgery, it was found that 91.5% of the patients experienced anxiety before their surgery[6]. It was reported that the presence of anxiety in patients before surgery caused an increase in the usage of doses of anesthesia, post-operative pain, prolonged hospitalizations, and patient dissatisfaction[3,7]. It was shown that providing educational information about the entire surgical process was effective in reducing the anxiety of patients in the pre-operative period[4]. Patients can also obtain information from the internet to meet their information needs. E-health literacy skills are important for patients to obtain information from electronic environments. E-health literacy is a tool that enables people to access necessary health-related information from electronic sources and make decisions about their health. In a study on the access of surgical patients to health-related information, 46.1% of the patients were found to use the internet, and 97.1% were using it to conduct online research about health[8]. In a study conducted with cancer patients, it was stated that 70.8% of the patients received information about their disease from the internet[9]. It was reported that 69.6% of individuals using the internet in Turkey had used it in the last 3 months to search for health-related information (e.g., injuries, diseases, nutrition, improving health)[10]. Studies have demonstrated that patients use electronic media such as the internet to obtain information.

Anxiety is common in patients after lung cancer surgery[11]. In a study examining the anxiety levels of 278 patients who underwent curative surgical resection for lung cancer, the prevalence of pre-operative anxiety was found to be 8%[7]. To the best of our knowledge, in the relevant literature, there exists no study examining the relationship between the pre-operative anxiety levels of patients scheduled for thoracic surgery and their e-health literacy, referring to their abilities of searching and obtaining information about their health using electronic media or the internet. In this study, it was aimed to examine the relationship between pre-operative anxiety and e-health literacy levels of patients scheduled for thoracic surgery. The results of this study will help show the tendency of patients to use e-health applications to reduce their anxiety.

Materials and methods

Aim

The aim of this study was to examine the relationship between pre-operative anxiety and e-health literacy in patients scheduled for thoracic surgery.

Design

This study was performed with a descriptive and correlational design.

Settings

The study was carried out in the thoracic surgery clinic of a university hospital in İzmir, Turkey. There are a total of 18 patient beds in this clinic, and patients were interviewed before their surgeries. Data were collected between April and October 2022.

Sample

All patients who were planned to undergo thoracic surgery in the thoracic surgery clinic of the University Hospital formed the population of the study. To identify the sample size required to conduct the study, the G*Power 3.0 program was used for the power analysis, and it was found that at least 90 patients in a single group needed to be included in the sample at a significance level of 0.5, with a medium effect size of 0.01, and a power of 0.95. Considering potential data losses, a total of 102 patients were interviewed.

The sample consisted of 102 patients > 18 years of age who were going to have their first thoracic surgery, had no hearing or vision problems, were internet users (at home, at work, or on mobile devices), and agreed to participate in the study. Patients who did not have internet access at home or on their mobile devices were excluded from the sample. Verbal and written consent was obtained from each patient.

Implementation

A patient information form was used to determine the sociodemographic and clinical characteristics of the patients. The Amsterdam pre-operative anxiety and information scale (APAIS) was used to assess the pre-operative anxiety levels of the patients and their need for information, the visual analog scale for anxiety (VAS-A) was used to assess the anxiety experienced by the patients before surgery, and the eHealth literacy scale (eHEALS) was used to determine their e-health literacy levels. The data were collected by the researchers in face-to-face interviews held with the patients before surgery.

PATIENT INFORMATION FORM

The form, which was created by the researchers based on the relevant literature, included questions about the sociodemographic and clinical characteristics of the patients[6,8].

APAIS

This scale was developed by Moerman et al. in 1996 to determine the pre-operative anxiety levels of patients and assess their need for information[12]. APAIS is a 5-point Likert-type scale consisting of 6 items[12].

Four items of the scale, constituting APAIS-A, assess anesthesia anxiety (items 1 and 2) and surgical procedure anxiety (items 4 and 5) (Cronbach's alpha 0.86). Two items, constituting APAIS-B (items 3 and 6), identify the need of the patient for information (Cronbach's alpha 0.72)[12]. The range of possible scores on APAIS-A, the anxiety subscale, is 4-20, while the range of possible scores on APAIS-B, the need for information subscale, is 2-10. Total scale scores vary between 6 and 30. High scores are associated with high levels of anxiety and need for information[12]. Çetinkaya et al. found $\alpha = 0.89$ for APAIS-A and $\alpha = 0.78$ for APAIS-B in their and showed that the scale had high reliability for the Turkish population[13].

VAS-A

The VAS-A is a scale that has been implemented and accepted all over the world for a long time. The scale has no language and is easy to implement[14]. Since it is quick and simple, it is a more global and multidimensional tool for assessing anxiety[15]. A strong positive correlation ($r = 0.686$; $p = 0.000$) was reported between VAS-A and the state-trait anxiety inventory[16]. In VAS-A, patients are asked to indicate their pre-operative anxiety level using a 10 cm horizontal line (values ranging from 0 to 10), measured from the left to the right. This scale was used to assess the self-evaluations of the patients about their anxiety levels experienced before surgery.

eHEALS

This scale was developed by Norman and Skinner in 2006 to measure the perceived skills of individuals in finding, evaluating, and applying electronic health information regarding health problems[17]. It is a 5-point Likert-type scale consisting of two items on internet use and eight items on internet attitudes. The first two items of the scale are evaluated separately. The minimum and maximum scores on the scale are 8 and 40. The Cronbach alpha has been found to be 0.88 and a high agreement[17]. A higher scale score indicates an increase in e-health literacy levels.

Data analysis

Frequency, percentage, and mean values were used in the analyses of the data. The data were analyzed in the SPSS 26 program. The one-way analysis of variance test was performed on the APAIS and VAS-A scores of the patients according to their reasons for undergoing surgery. Pearson's correlation analyses were carried out to identify relationships between the APAIS, VAS-A, and eHEALS scores of the patients. Linear regression analysis was performed to identify the independent variables (age, reason for surgery) predicting the e-health literacy levels of the patients.

Ethical dimension

Ethics committee approval (no: 2022/12-02) and institutional permission (no: E-43940943-100-198235) from the institution where the study would be conducted were obtained before starting to collect data. The purpose of the study was explained to the patients, and written informed consent was obtained from the patients who agreed to participate in the study. This study was descriptive. No invasive intervention was performed in the study. Therefore, no

harm was caused to the patients during the study process. No fee was paid to the patients in exchange for their participation. It was explained to the patients that they could leave the study at any time during the research process. This study was conducted in accordance with the principles of the Declaration of Helsinki, as well as research and publication ethics.

Results

The mean age of the patients was 53.29 ± 19.35 years. While 34.3% of the patients were > 65 years old, 64.7% (n = 66) were male, 71.6% would undergo surgery due to a lung mass, and 85.3% stated that they needed pre-operative information (Table 1).

According to the pre-operative measurements, the mean VAS-A score of the patients was 6.02 ± 2.51, and their mean APAIS-A score was 11.56 ± 3.89 (min: 4 - max: 20) (Table 2). The patients were found to experience moderate anxiety. In the evaluations made based on the surgical indications of the patients, the mean VAS-A score of the patients with lung masses was found as 6.26 ± 2.46, the mean VAS-A score of those with chest trauma was 5.90 ± 3.24, and the mean VAS-A score of those who had chest deformities was 5.21 ± 2.25. There was no significant difference in the VAS-A scores of the patients according to their reasons for undergoing surgery (F: 1.33 p = 0.267, p > 0.05).

According to their APAIS scores, 39.2% of the patients needed vast amounts of information about the surgical procedure. The mean APAIS-B score of the patients was 6.85 ± 2.38. It was determined that the patients had moderate levels of need for information in general. The mean total APAIS score of the patients was 18.73 ± 5.85 (Table 2). In the evaluations made based on the surgical indications of the patients, the mean total APAIS score of the patients who had lung masses was 18.42 ± 5.89, the mean total APAIS score of those with chest trauma was 21.2 ± 8.20, and the mean total APAIS score of those who had chest deformities was 16.68 ± 5.57. There was no significant difference in the mean total APAIS scores of the patients based on their reasons for undergoing surgery (F: 1.99, p = 0.141).

The mean eHEALS score of the patients was 24.84 ± 9.21 (min: 8 - max: 40) (Table 2). While 41.2% of the patients stated that it is important to access health resources on the internet, 52% stated that the internet is useful when making decisions about their health.

Table 1. Sociodemographic and clinical characteristics of the patients (n = 102)

Sociodemographic and clinical features	X ± sd (min-max)	
Age	53.29 ± 19.35 (18-91)	
	n	**%**
Sex		
Famale	36	35.4
Male	66	64.7
Age		
65 or younger	67	65.7
66 or older	32	34.3
Reason for surgery		
Cancer (n = 73)	73	71.6
Chest trauma (n = 10)	10	9.8
Chest deformities (n = 19)	19	18.6
First feeling after the decision to undergo surgery		
Anger	6	5.9
Anxiety	26	25.5
Fear	39	38.2
Sadness	4	3.9
Calmness	27	26.5
Needs information about the surgery		
Yes	87	85.3
No	15	14.7

n: total number, %: percentage, x ± sd: mean and standard deviation.

Table 2. Total VAS-A, APAIS, and eHEALS scores of the patients

Scales	x ± sd (min-max)
VAS-A	6.02 ± 2.51 (0-10)
APAIS-A	11.56 ± 3.89 (4-20)
APAIS-B	6.85 ± 2.38 (2-10)
APAIS total	18.73 ± 5.85 (6-30)
eHEALS	24.84 ± 9.21 (8-40)

x ± sd: mean and standard deviation; VAS-A: Visual Analog Scale for anxiety; APAIS-A: APAIS A, anesthesia anxiety (items 1 and 2) and surgical procedure anxiety (items 4 and 5); APAIS-B: APAIS-B, (items 3 and 6) information needs; eHEALS: eHealth literacy scale.

There was a statistically significant relationship between the total eHEALS scores of the patients and their age (t: 2.896, p < 0.05). High e-health literacy levels were found in patients under 65 years of age (Table 3). The correlation between the ages of the patients and their total eHEALS scores was negative, moderate, and statistically significant (r = −0.409, p = 0.001). As the ages of the patients decreased, their e-health literacy levels increased. In other words, younger patients had higher eHEALS scores.

Table 3. Effects of sex, age, and reason for surgery on e-health literacy

Variables	X ± SD	t/F p
Age		
65 years and under	26.68 ± 8.78	t = 2.896
66 years and older	21.31 ± 9.10	p = 0.005
Sex		
Famale	26.00 ± 10.0	t = 0.936
Male	24.21 ± 8.76	p = 0.352
Reason for surgery		
Cancer (n = 73)	23.31 ± 9.33	F = 4.087
Chest trauma (n = 10)	26.80 ± 8.20	p = 0.020
Chest deformities (n = 19)	29.68 ± 7.63	

N: frequency; X: mean; SD: standard deviation; t: independent-samples t-test; p < 0.05
F: analysis of variance (ANOVA).

Table 4. Relationships between pre-operative anxiety and e-health literacy

Scales	eHEALS total	
	r	p
VAS-A	−0.090	0.371
APAIS- A (anxiety)	0.009	0.925
APAIS- B (need for information)	−0.063	0.530
APAIS total	−0.041	0.679

r: Pearson correlation, p < 0.05.

Table 5. Linear regression analysis of variables potentially predicting e-health literacy

Variables	Model				
	B	SH	β	T	p
Constant	35.667	5.043		7.073	0.000
Age	−0.199	0.060	−0.418	−3.294	0.001
Reason for surgery	−0.153	1.476	−0.013	−0.104	0.918
R	0.409				
R^2	0.167				
F	9.955				
p	0.000				
DW (1.5-2.5)	1.875				

p < 0.050; B: estimation equation; SH: standard error; β: beta; R2: coefficient of determination; DW: Durbin-Watson.

There was no statistically significant relationship between the total eHEALS scores of the patients and their sex (t: 0.936 p > 0.05). A significant relationship was found between the e-health literacy levels of the patients and their reasons for undergoing surgery (F: 4.087, p < 0.05). The total eHEALS scores of the patients who were scheduled to undergo surgery due to chest deformities were high (Table 3).

In the examination of the relationship between the pre-operative anxiety and e-health literacy levels of the patients based on their VAS-A and APAIS scores, no significant correlation was found between these two variables (Table 4).

In the logistic regression analysis of the variables related to the total e-health literacy levels of the patients, the predictive role of the ages of the patients and their reasons for undergoing surgery was examined. It was determined that the ages of the patients (β: −0.436 p = 0.001) significantly predicted their e-health literacy levels. According to the model, a one-unit decrease in age increased the total eHEALS score by 0.19. According to the model, these variables explained 16% of the total variance in e-health literacy (Table 5).

Discussion

In this study, the relationship between the pre-operative anxiety and e-health literacy levels of patients scheduled for thoracic surgery was examined.

The mean VAS-A and APAIS-A scores of the patients, indicating their pre-operative anxiety levels, were 6.02 ± 2.51 and 11.56 ± 3.89, respectively. The mean total APAIS score of the patients was 18.73 ± 5.85. There was no significant difference in the pre-operative anxiety levels of the patients measured by APAIS and VAS-A based on their reasons for undergoing surgery. The patients had moderate anxiety levels in general, regardless of their reasons for undergoing surgery. In a study investigating pre-operative anxiety with APAIS, 3087 patients were interviewed. In the study, 92.6% of the patients reported that they experienced pre-operative anxiety, and 40.5% stated that they experienced high levels of anxiety[18]. In our study, 85.3% of the patients stated that they needed pre-operative information. In addition, according to their APAIS scores, 39.2% of the patients wanted to receive vast amounts of information about the surgical procedure, while the overall level of need for information among all patients was moderate. It was shown that education given to patients before surgery had a positive effect in reducing their anxiety levels[19]. Therefore, pre-operative patients may experience moderate anxiety due to their need for information on various matters.

In this study, 41.2% of the patients stated that it is important to access health resources on the internet, and 52% stated that the internet is useful when making decisions about their health. In a study on the e-health literacy of patients with lung cancer, 29.3% of the patients stated that it is important to access health resources on the internet, and 53.7% stated that the internet is useful when making decisions about their health[20]. In the pre-operative period, patients may need information in accordance with their needs or because they are not informed adequately. In cases where patients cannot get answers from the healthcare team on matters related to their health, or when the healthcare team's answers do not comfort them, they may look for information on the internet.

The patients who participated in this study were found to have moderate e-health literacy levels. A study on the e-health literacy of patients with lung cancer found low levels of e-health literacy[20]. In studies conducted with cancer patients, it has been stated that the e-health literacy levels of these patients are moderate[21-23]. The moderate e-health literacy levels of the patients in our study may be associated with their limited knowledge and skills about how to use the internet to obtain information.

In our study, it was determined that the e-health literacy levels of the patients under the age of 65 were high (t: 2.896, p < 0.05). A statistically significant moderate correlation was found between the ages of the patients and their e-health literacy levels (r = −0.409, p = 0.001). As the ages of the patients decreased, their e-health literacy levels increased. In other words, younger patients had higher total eHEALS scores. Other studies have shown that being young affects the e-health literacy levels of individuals[21,23-25]. In another study conducted with lung cancer patients, no significant relationship was found between e-health literacy and age[20]. A study evaluating cancer-related internet usage patterns in adolescents and young adults (18-39 years) and adult cancer patients (40+ years) revealed that adolescent and young adult (18-39 years) cancer patients ran significantly more searches on the internet per day[26]. We think the high internet use rates of patients under the age of 65 affect their e-health literacy levels positively.

There was no statistically significant difference in the total eHEALS scores of the patients based on their sex (t: 0.93 p > 0.05). In one study, it was found that female patients had higher e-health literacy levels than male patients[22]. In another study, the e-health literacy levels of immigrant female patients were found to be lower than the levels of male patients[27]. Another study showed no significant relationship between e-health literacy and sex[28]. No clear results have yet been found regarding the relationship between e-health literacy and sex. The e-health literacy levels of men and women may be similar due to their similar levels of access to and usage of e-health applications.

A significant relationship was found between the e-health literacy levels of the patients included in our study and their reasons for undergoing surgery (F: 4.087, p < 0.05). The total eHEALS scores of the patients who were going to undergo surgery due to chest wall deformities were high. In the relevant literature, another study on the e-health literacy levels of patients scheduled for thoracic surgery could not be found. Patients with chest wall deformities are young patients. Young patients have higher rates of internet and social media usage[26]. Therefore, patients who will undergo surgery for chest wall deformities may have higher e-health literacy levels.

No significant correlation was found between the anxiety and e-health literacy levels of the patients in our study. Organized results of a study examining anxiety and health literacy in patients undergoing same-day surgery have not yet been published[29]. Likewise, studies examining the relationship between pre-operative anxiety and e-health literacy could not be found. The absence of a significant relationship between e-health literacy and pre-operative anxiety in the context of efforts to reduce the anxiety levels of surgical patients may be explained by the possibility that these patients obtain health-related information from other sources such as doctors, nurses, other patients, and patient relatives to inform their decisions about their health, rather than getting information from electronic sources.

In our study, the predictive effects of two variables (age and reason for surgery) on the e-health literacy levels of the patients were examined by logistic regression analysis. The variables that were found significantly correlated with e-health literacy were included in the regression model. The age variable was a significant and negative predictor of the e-health literacy levels of the patients (β: −0.418 p = 0.001). The e-health literacy levels of the patients increased as their age decreased. In a study examining the factors affecting the e-health literacy levels of patients with lung cancer, a significant relationship was found between e-health literacy and age (p < 0.005)[20]. In other studies examining the factors affecting e-health literacy, significant relationships

have been identified between e-health literacy and age (p < 0.005)[21,26,30,31]. Internet use, especially health-related internet use, is more prevalent among young adults compared to older adults[32]. This may affect the e-health literacy levels of patients because young patients already use the internet in many areas of their lives, and they are likely to use it to find answers to their questions about health.

Conclusion

Patients who were scheduled for thoracic surgery were determined to need information regarding the surgical process. They had moderate anxiety levels because of their information needs. The patients were also found to have moderate e-health literacy levels. There was no significant relationship between the pre-operative anxiety and e-health literacy levels of the patients. A significant relationship was found between the e-health literacy levels of the patients and their ages, and the patients under the age of 65 had higher levels of e-health literacy. Although the e-health literacy levels of young patients are high, it is recommended that healthcare professionals use educational materials that can be easily used by patients in training programs to be given to all patients, especially patients aged 65 or older, and develop easy-to-use, attractive, and highly accessible online platforms and mobile applications for patients using e-health applications. Healthcare professionals need to focus on the information-related needs and information-seeking behaviors of patients. This study will provide nurses with information about the health literacy status of patients who are scheduled for surgery.

Limitations

In our study, there were patients who were scheduled for thoracic surgery for different reasons. For example, patients with chest deformities had higher e-health literacy levels, and this group was also younger. The small number of patients in this group was a limitation. The e-health literacy levels of the patients who would undergo surgery due to cancer were lower than the levels of other patients. It was found that cancer patients trust online health information less[33]. Other studies showed that cancer patients face several challenges when searching for health-related information and using the internet to solve health problems. In particular, it was observed that they often had problems identifying websites with reliable health information[34,35]. This study did not focus on the information needs and information-seeking behaviors of cancer patients. Another limitation was that e-health literacy was measured once in a clinical setting before surgery. Patients who had thoracic surgery for different reasons can be evaluated in different studies and with larger samples.

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Conflicts of interest

The authors declare no conflicts of interest.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

Use of artificial intelligence for generating text. The authors declare that they have not used any type of generative artificial intelligence for the writing of this manuscript or for the creation of images, graphics, tables, or their corresponding captions.

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