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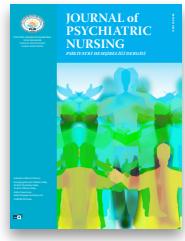

Original Article

Death anxiety and sleep quality in patients with implantable cardioverter defibrillators

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Abstract

Objectives: Implantable cardioverter-defibrillators (ICDs) are an effective treatment for preventing sudden cardiac death, but they can cause certain psychosocial problems in patients. Although patients are particularly at risk for death anxiety and sleep disorders, these issues have not been addressed in any research together. The goal of this descriptive study was to investigate the link between patients with ICD and their levels of death anxiety and sleep quality.

Methods: Eighty-eight patients who fulfilled the inclusion criteria and attended a university hospital for routine battery follow-up participated in the study. The patient information questionnaire, the Pittsburgh sleep quality ındex, and the Templer death anxiety scale were used to collect the data. The data were analyzed with the SAS 9.4 package program. The Shapiro-Wilk test, t test, Chi-squared test, Mann–Whitney U-test, and variance analysis were used to analyze the data.

Results: Patients with low socioeconomic standing had poorer sleep quality ($p<0.001$), and women under the age of 50 had higher levels of death anxiety ($p<0.001$). In addition, ICD shocks substantially reduced sleep quality and raised anxiety levels ($p<0.05$). The anxiety and problems related to ICD increased death anxiety significantly ($p<0.05$).

Conclusion: In Turkish patients, ICD is linked to elevated levels of anxiety about death and poor sleep quality. The study's findings are expected to will donate to the biopsychosocial support of the patients by planning appropriate interventions to improve the sleep quality and anxiety levels of the patients. It is advised that the findings of the study be examined with subsequent studies and various populations to differentiate the effects of comorbid conditions and cultural traits on ICD experiences.

Keywords: Death anxiety; implantable cardioverter defibrillator; nursing; sleep quality.

Implantable cardioverter defibrillators (ICD) are electronic and programmable multifunctional devices that are implanted under the skin permanently.[1,2] These devices are used to treat patients with arrhythmias and advanced heart failure (HF) that might cause death.[3] According to a global analysis of pacemaker and ICD implantations and replacements performed in 2024, 25.384.429 ICD implantations were performed in 1 year.[4] The increase in arrhythmias day by day increases the need for treatment and indirectly the need for ICD implantation.[5]

According to the 2017 report of the European Heart Rhythm Association, the implantation rates of ICDs by 44% in the past decade.[6] It was reported that approximately 130,000 ICDs were implanted in Europe in 2020. Looking at the top three countries with the most ICD implantations in 2020, it was reported that the number of ICD implantations per million population was 263 in the Czech Republic, 256 in Germany, and 231 in Italy.[7] It was reported that the number of ICD implantations per million population in Türkiye in 2016, was 115.13, and it was shown that the number of ICD implantations increased by 804.1% in the past decade.[6]

Although ICD implantation is a 30–40% effective treatment method in reducing mortality and morbidity, living with this device can bring with psychosocial problems such as worry, anxiety, and sleep problems in patients.[8,9] Patients with ICD are

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reported to experience greater anxiety compared to the general population and other patient populations.[10] Foreignness of the ICD to the body, thoughts such as about constantly living with the device, the fact that it works in situations that may result in death and its battery may run out may cause patients to experience anxiety. The fact that the device has a shocking feature is another feature that increases anxiety levels. Especially the uncertainty of the experience shock timing, place, and sensation of the shock, thoughts of receiving a shock at an inappropriate time, losing consciousness, and not being safe trigger anxiety.[11,12] In particular, it has been shown that fear of uncertainty may mediate the relation between anxiety and depression.[13] Studies have reported that individuals describe the ICD as a device that constantly reminds them of death, making them feel like they are on the fine line between life and death and living on the edge.[10,11] This situation may cause individuals to face various problems, especially death anxiety and sleep problems.[11–13]

Death anxiety refers to the emotion related to the anticipation or awareness of death. Especially thinking that heart is more vital than other organs causes individuals with heart disease to have more death anxiety compared to other patient groups.[14,15] An increase in anxiety levels affects patients negatively and leads to sleep disorders alongside psychosocial problems.[14,16] Studies conducted showed that 70% of individuals with heart diseases develop sleep disorders.[17,18] Likewise, sleep problems have been shown to be prevalent among patients with ICDs.[19]

Since sleep is an important factor affecting individuals' quality of life and physical and mental well-being, determining the sleep quality and death anxiety levels of ICD patients becomes more important.[20] Nurses have important roles and responsibilities in planning appropriate interventions to reduce anxiety levels, particularly death anxiety, and to improve sleep quality. It is thought that the results of this study will increase the awareness of the sleep quality and death anxiety levels experienced by ICD patients, and will also improve the nursing care provided by planning appropriate interventions to prevent complications that may develop. In addition, it is thought that this study will be an innovative study that will contribute to the literature by examining which have not been evaluated before the death anxiety levels, and their relationship with sleep quality levels in individuals with ICD.

Research Questions

In patients with have ICD:

- What are the level of death anxiety?
- What are the level of sleep quality?
- Is there a relationship between sociodemographic characteristics and sleep quality and death anxiety levels?
- Is there a relationship between the complaints they experienced regarding ICD and their level of death anxiety?
- Is there a relationship between the complaints they experienced regarding ICD and their level of sleep quality levels?
- Is there a relationship between sleep quality and death anxiety levels?

What is presently known on this subject?

- ICDs are devices that are used to prevent sudden cardiac deaths and implantation rates are increasing day by day. This device causes some psychosocial problems, especially anxiety, in individuals because it is foreign to the body and requires changes in daily lifestyle.

What does this article add to the existing knowledge?

- This study is important and new because it evaluates together death anxiety and sleep quality phenomena that have not been examined before in ICD patients. The results showed that ICD negatively affected individuals' death anxiety and sleep quality levels. In addition, death anxiety and shock anxiety are the most commonly reported problems associated with ICD. Problems related to ICD affect sleep quality and death anxiety levels. In particular, individuals who experience shock have higher levels of death anxiety levels and significantly lower sleep quality levels.

What are the implications for practice?

- It is anticipated that the study results will provide awareness to prevent and reduce death anxiety, sleep problems, and device-related issues experienced by ICD patients, and support the planning of appropriate nursing interventions. Especially after any cardiac disease, the importance of taking into account risk groups, such as young age and low economic status, is emphasized in evaluating individuals with routine periodic examinations. In this way, it is predicted that the nursing care provided will be improved and its quality will be increased and, it is envisaged that a holistic approach can be provided to individuals.

Materials and Method

Research Objective and Design

This descriptive study was conducted to determine the levels of death anxiety and sleep quality and to examine their relationship in patients with ICD.

Population and Sample

The research population consisted of 113 patients who were admitted to the hospital within 1 year and underwent ICD implantation. The sample size was determined to be 88 patients with 95% confidence interval, 80% power, and 5% type I error. The participants were included in the study as individuals who had ICD implantation, agreed to participate in the study, had no mental or communication disabilities, and were 18 years of age or older. The exclusion criteria were patients implanted with a device other (cardiac reconstruction therapy or pacemaker) than ICD, and who refused to participate in the study. The research was conducted with patients who met the inclusion criteria and applied to the university hospital for routine battery control. Routine battery check is usually done every 6 months. However, depending on the device type, battery status, and arrhythmia frequency, it can be performed at intervals ranging from 1 to 6 months after implantation. For this reason, the research had a wide sample size in terms of reaching individuals who were implanted at different times.

Data Collection Process

The study was conducted between September 2018 and February 2019. The data were collected by personal and face-to-face interview method. The preliminary application of the study was carried out with four patients who met the inclusion criteria after obtaining the necessary permissions from institutions and the Hospital Ethics Committee. The patients who participated in the preliminary application were not included in the sample of the study. ICD patients who arrived at the clinic for routine battery follow-ups were first briefly informed about the subject and the application method of the research, and then, they were invited to the study. Written consent was obtained from patients who agreed to participate in the study. Interviews were conducted in a clinic room where patients were able to feel comfortable and it took approximately 15–20 min. During the data collection stage of the research, Patient Information Form, Pittsburgh Sleep Quality Index (PSQI), and Templer Death Anxiety Scale (DAS) were used.

Data Collection Tools

Templer DAS

Developed by Templer[21] in 1970 to determine the level of death anxiety, the DAS is a scale consisting of 15 items with binary Likert questions. The internal consistency of the scale was shown as 0.76. The Turkish validity and reliability of the scale was carried out by Şenol (1989) and the internal consistency was determined as 0.72 with the Cronbach alpha value. Akça and Köse (2008) carried out the scale adaptation to Turkish, and the internal consistency value was determined as 0.75 with the Kuder Richardson-20 formula.

For each item in the scale, a score of "one" is given for a "yes" response, and a score of "zero" is given for a "no" response, and only the five item scores between items 10 and 14 are calculated as the reverse pattern. The total score constitutes the death anxiety score. The scores that can be obtained from the scale are between 0 and 15. The highest score is 15, and a score of 0–4 is considered "mild death anxiety," a score of 5–9 is considered "moderate death anxiety," a score of 10–14 is considered "severe death anxiety" and a score of 15 is indicates"panic death anxiety." and a score of 15 is considered "panic death anxiety." As the score increases, the level of death anxiety rises.[22,23]

PSQI

The PSQI was developed by Buysse et al.[24] Validity and reliability were carried out by Ağargün et al.[25] The scale aims to determine the sleep quality levels of patients in the past month. The Cronbach alpha internal consistency value of the scale was reported as 0.80. It consists of a total of 24 questions and 20 items, and the last two items are not included in the evaluation because they are answered by the patients' partners or roommates. The other 18 items consist of seven different subcomponents, and each component is scored between 0 and 3 points. As the score increases, sleep quality decreases.

When evaluating the scale, three components are scored with one question, and four are scored with a total score of more than one question. In addition, two different components are scored in the fourth question. The total score of all components forms the scale score and varies between 0–21. Scores of five and above indicate poor sleep quality, and scores below five indicate good sleep quality.[24,25]

Ethical Responsibilities

Following the planning of the study, ethical approval was obtained from Akdeniz University, Faculty of Medicine, Clinical Research Ethics Committee (Research number: 70904504/297, Date: 27.06.2018, No: 443). Before starting the study, institutional approval was obtained from the university hospital where the study would be conducted. Participants were informed about the study, and their verbal and written consents were obtained. It was also stated that they participated in the study voluntarily and could withdraw at any time. The principles of the Declaration of Helsinki were followed at all stages of the study.

Data Analysis

In the evaluation of the data, SAS 9.4 package program was used for statistical analysis. The obtained data were first evaluated with descriptive statistics. While mean and standard deviation values were used for quantitative variables, number and percentage values were used for qualitative variables. Shapiro-Wilk test was used to evaluate the conformity of the data to normal distribution and it was determined that they were not normally distributed. Non-parametric tests were used for statistical analysis and Mann–Whitney U-test was used for binary variables. Scale items, sub-dimensions of the scale, and general scores of the scale were presented in tables as means and standard deviations. The relationship between the general scores of the scale and the sub-dimension score means was calculated with the correlation coefficient. The statistical significance level for the entire study was determined as 0.05. STROBE guidelines were followed for reporting the data.

Results

Sociodemographic and Disease-Related Findings

The mean age of the patients participating in the study was 61.90+12.52. Most of the participants were male, married, and living with their nuclear family. In addition, the patients were mostly primary school graduates, retired, and had a medium economic status. About 56.8% of the patients had an ICD device implanted due to HF. More than half of the patients had

Table 1. Distribution of patients according to descriptive features

Descriptive features (n=88)	n	%	Descriptive features (n=88)	n	%
Age, mean (SD)	61.90 (12.52)		Presence of heart failure		
Gender			Yes	63	71.6
Female	24	27.3	No	25	28.4
Male	64	72.7	NYHA heart failure classification		
Marital status			Class II	29	46.0
Married	71	80.7	Class III	27	42.9
Single	17	19.3	Class IV	7	11.1
Family type			Ejection fraction (EF), mean (SD)	31.59 (10.81)	
Nuclear family	78	88.6	Presence of chronic disease additional to diagnosis		
Extended family	4	4.5	Yes	48	54.5
Lived alone	6	6.8	No	40	45.4
Education status			Chronic disease status		
Uneducated	5	5.7	Diabetes mellitus	9	18.7
Primary education	46	52.3	Hypertension	15	31.2
High school	22	25.0	Asthma/COPD	3	6.2
University	15	17.0	Diabetes and hypertension	8	16.7
Economical situation			Diabetes, hypertension, and asthma/COPD	10	20.8
Income over expense	2	2.3	Other	3	6.2
Income expense equal	58	65.9	ICD duration of use		
Income less than expense	28	31.8	<12 months	16	18.2
Reason of ICD implant			13–36 months	35	39.8
Arrhythmia	25	28.4	37–72 months	19	21.6
Heart failure	50	56.8	>73 months	18	20.4
Arrhythmia and heart failure	13	14.8			

SD: Standard deviation; ICD: Implantable cardioverter defibrillator; NYHA: The new york heart association; COPD: Chronic obstructive pulmonary disease.

New York Heart Association (NYHA) Class II HF symptoms. The patients' ejection fraction values ranged from 10% to 60%, and the mean ejection fraction value was 31.58%. More than half of the patients had chronic diseases, most of which were hypertension. The duration of ICD use by the patients was mostly between 13 and 36 months. Findings regarding the sociodemographic characteristics of the patients are shown in Table 1.

When the symptoms frequently experienced by patients were examined, most patients reported chest tightness, chest pain, breathlessness, dizziness, fatigue easily, and sleep problems. Sleep problems in particular were reported as a symptom experienced almost all the time. The symptoms experienced by patients in the past 6 months were determined as, in decreasing order, fatigue easily, breathlessness, sleep problems, dizziness, shortness of breath, palpitations, chest pain, chest tightness, and fainting.

When the problems experienced by the patients regarding ICDs were examined, it was determined that the most frequently experienced problems were death anxiety, experiencing shock and experiencing warning or cardioversion, and avoiding driving due to the thought of shock was the least experienced problem. The rate of patients who experienced shock at least once was determined as 37.5%. In patients who experienced shock, 33.3% experienced shock once, 36.4% twice, 21.2% 3 times, and 9.1% four or more times. It was also determined that patients who experienced shock also experienced pain due to shock. Death anxiety was determined to be the most experienced problem by the patients. It was determined that the uncertainty of the shocking time and the concerns about experiencing the shock outside the home were among the main problems accompanying death anxiety.

The problems experienced with ICD also vary according to the patients' shock experience. Patients who experienced shock reported more problems, and it was determined that patients who experienced shock once reported more concerns about experiencing continuous stress due to shock and losing consciousness at the time of shock. It was determined that patients who experienced shock 3 or more times reported fewer problems. The distribution of problems experienced by patients regarding ICD according to shock experience is shown in Figure 1. In descending order, it was determined that concerns about feeling pain due to shock (x^2=5.48/p=0.019), losing consciousness at the time of shock (x^2=3.99/p=0.046), and death (x^2=4.61/p=0.032) anxiety were statistically significantly higher in patients who experienced shock.

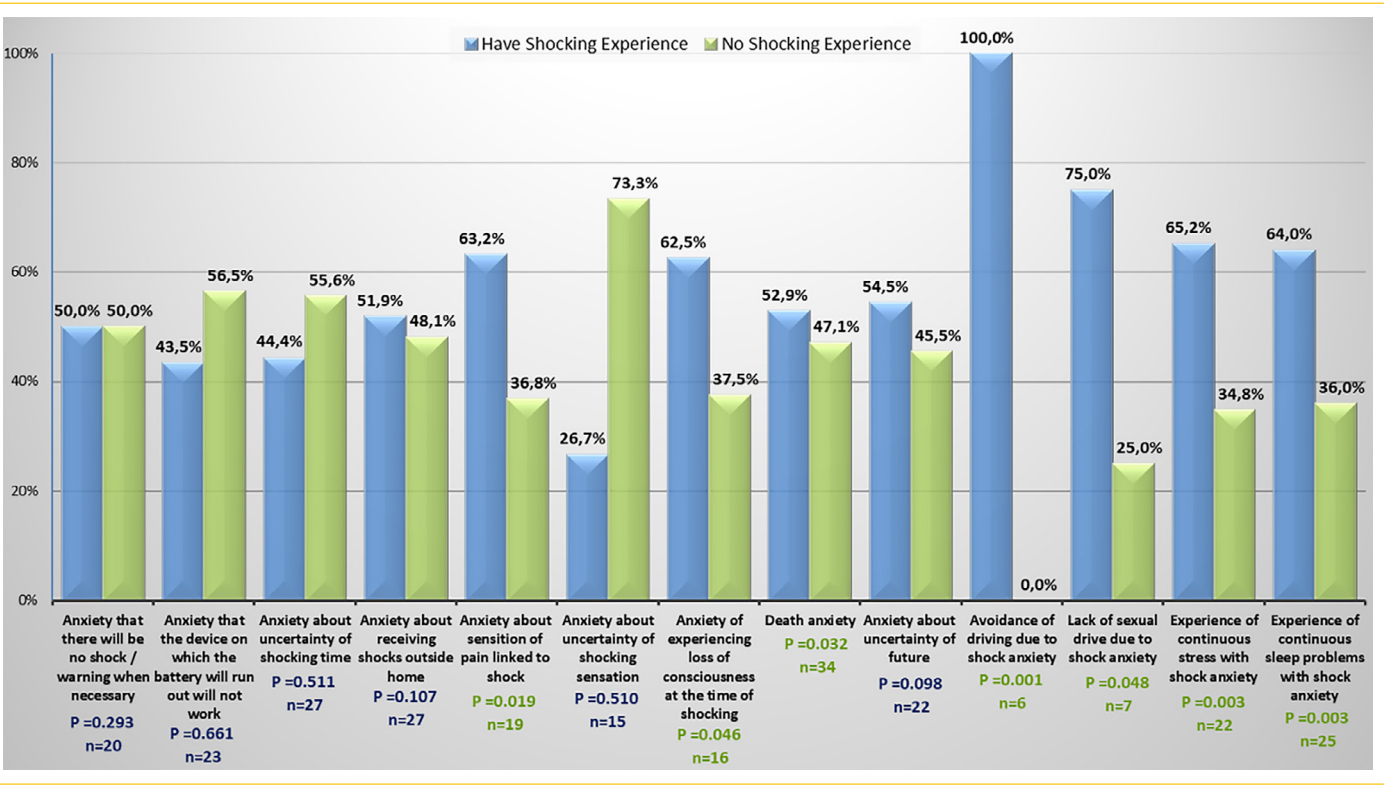

Figure 1. The distribution of problems experienced by patients due to implantable cardioverter-defibrillators is demonstrated according to experiences of being shocked. A statistically significant relationship was found between sensation of pain linked to shock, experiencing loss of consciousness at the time of shocking and death anxiety; avoidance of driving due to shock anxiety, lack of sexual drive due to shock anxiety, and experience of continuous sleep problems and the experience of shocking of patients.

It was determined that all patients who experienced shock had a problem with driving due to shock anxiety, and this relationship was statistically significant (x^2=10.73/ p=0.001). It was determined that sexual reluctance due to shocking anxiety was higher in patients who experienced shocking and this anxiety did not change with the number of shocks, and the relationship between shocking experience and this problem was significant (x^2=3.67/ p=0.048). It was determined that constant stress from shock anxiety (x^2=8.67/p=0.003) and sleep problems (x^2=8.94/ p=0.003) were higher in patients who experienced shock, and the relationship between these problems and the shock experience was statistically significant. In patients who did not experience shock, it was determined that the main problems experienced were concerns about the battery running out, the device not working, the feeling of shock, and the uncertainty of its timing. The most experienced and persistent stressful problems throughout the study can be listed in decreasing order as death anxiety, uncertainty of the shocking time, experiencing the shock outside the home, anxiety that the battery will run out, the device will not work, and persistent sleep problems due to shock.

Findings on Death Anxiety and Sleep Quality

The distribution of the mean scores of the patients participating in the study regarding the DAS, PSQI, and PSQI subcomponents is shown in Table 2. The global PSQI score is between 0 and 21 points. The range in our study was determined as 2–17 points (Mean=8.44; standard deviation [SD]=2.90; n=88). In our study, seven patients had good sleep quality and 81 patients had poor sleep quality. When the mean PSQI scores of the patients participating in the study were examined, it was determined that the patients who were married under the age of 50, primary school graduates, living with an extended family, unemployed,

Table 2. Distribution of patient information form, Templer death anxiety scale, Pittsburgh sleep quality index, and subcomponents' mean scores

Scales	Mean ($\bar{X}$)	SD
Templer death anxiety scale	7.4659	3.9652
Pittsburgh sleep quality index	8.4432	2.9040
• Subjective sleep quality	1.0568	0.5745
• Sleep latency	1.4886	0.9708
• Sleep duration	1.1023	1.0938
• Habitual sleep efficiency	2.8182	0.6703
• Sleep disturbances	1.2273	0.5192
• Use of sleeping medications	0.2159	0.7497
• Daytime dysfunction due to sleepiness	0.5341	0.8158

SD: Standard deviation.

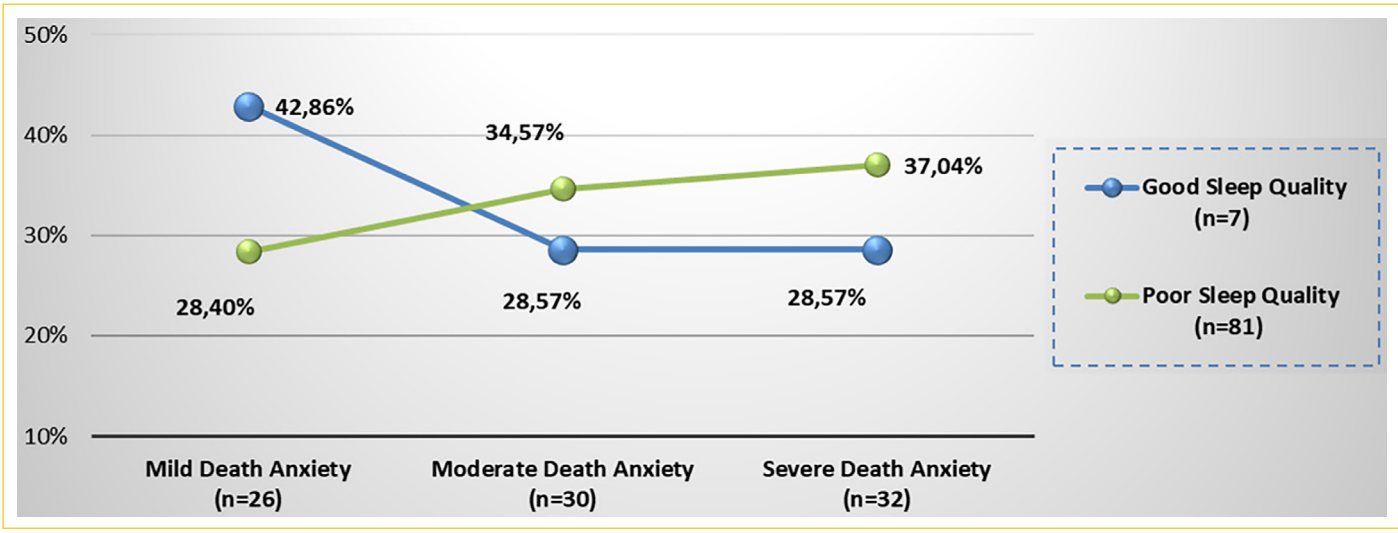

Figure 2. The relationship between death anxiety and sleep quality levels is shown. It was determined about most of the patients experienced poor sleep quality and severe death anxiety. It was determined about most of the patients with good sleep quality had mild death, and most of the patients with poor sleep quality had severe death anxiety. This indicates about as the level of death anxiety increases, sleep quality levels decrease.

or retired had higher mean PSQI scores compared to the other groups. In addition, the mean PSQI scores of the men participating in the study were determined to be higher than the women, but all these differences were not found to be significant. It was determined that the mean PSQI scores were higher in the patient group with poor economic status compared to the other economic status groups and these differences were statistically significant (x^2=8.99 /p=0.0003). When the PSQI subcomponent scores were evaluated, it was found that the sleep efficiency subcomponent score was higher in patients who had an ICD due to HF diagnosis compared to other diagnostic groups. According to the NYHA classification, the sleep disturbance subcomponent score was higher in patients at the Class IV level compared to other class levels. It was determined that these differences between the mean scores for both subcomponents were statistically significant (x^2=6.40/p=0.003).

The global DAS score ranges from 0 to 15 points, while the DAS score in our study ranged from 1 to 14 points (Ort=7.47; SD=3.97; n=88). It was determined that 26 patients who participated in our study had mild, 30 had moderate, and 32 had severe death anxiety. In addition, no patients who experienced panic-level death anxiety were found in the study. It was determined that the female patients who participated in the study had higher mean DAS scores than male patients and that this difference in scores between them was statistically significant (x^2=4.78/ p<0.001). Similarly, it was determined that the mean DAS scores in patients aged 50 and under and in the 51–60 age group were higher than in other groups and these differences were statistically significant (x^2=5.81/p=0.0012). In addition, it was determined that the DAS scores were higher in single or women living alone patients compared to other groups, but no significant relationship was found between them. When the disease characteristics of the patients and the scale scores were examined, it was determined that the difference between the DAS and PSQI mean scores was not statistically significant.

When the relationship between the problems experienced by the patients participating in our study and their sleep quality levels was examined, it was determined that almost all patients with ICD-related problems had poor sleep quality. In particular, it was determined that shortness of breath and sleep problems were statistically significantly related to sleep quality (respectively, x^2=6.05/p=0.0139, x^2=6.94/p=0.0084). It was also determined that a significant relationship existed between shock experience and sleep quality levels (x^2=2.99/p=0.042).

When the ICD-related problems experienced by the patients and their death anxiety levels were examined, it was determined that most of the patients experiencing the problems had severe death anxiety levels, but this was not statistically significant. However, it was determined that the feeling of uncertainty about the future, the concern that there will be no shock or warning when necessary, the uncertainty of the sense of shock, the pain experienced due to shock, and the fears of losing consciousness at the time of shocking were statistically significantly related to death anxiety levels (respectively x^2=12.86/p=0.002, x^2=6.46/p=0,040, x^2=8.06/p=0.018, x^2=11.39/p=0.003, and x^2=9.09 p=0.011). It has been determined that there is a statistically significant relationship between the anxiety that the battery will run out and the device will not work, the anxiety about the uncertainty of the shocking time, the anxiety about experiencing the shock outside the home, the death anxiety, the constant stress experienced due to the anxiety about shocking, and the levels of death anxiety (respectively, x^2=19.20/p=0.000, x^2=15.93/p=0.000, x^2=19.64/p=0.000, x^2=19.98/p=0.000, and x^2=15.41/p=0.000).

Table 3. Distribution of the correlations between Templer death anxiety scale and Pittsburgh sleep quality index and its subcomponents

	Subjective sleep quality	Sleep latency	Sleep duration	Habitual sleep efficiency	Sleep disturbances	Use of sleeping medications	Daytime dysfunction due to sleepiness	PSQI total	DAS total
Subjective sleep quality	1.0000								
Sleep latency	0.4030	0.0001							
	1.0000								
Sleep duration	0.3382	0.3421	1.0000						
	0.0013	**0.0011**							
Habitual sleep efficiency	-0.0326	0.0498	0.0256	1.0000					
	0.7633	0.6451	0.8125						
Sleep disturbances	0.2645	0.2560	0.2420	0.0540					
	0.0128	**0.0161**	**0.0231**	0.6170	1.0000				
Use of sleeping medications	0.1847	0.0903	0.0008	0.0790	0.0201	1.0000			
	0.0850	0.4029	0.9941	0.4643	0.8523				
Daytime dysfunction due to sleepiness	0.2779	0.1892	0.1957	0.0955	0.1443	0.0724	1.0000		
	0.0088	0.0775	0.0676	0.3759	0.1798	0.5026			
PSQI total	0.6254	0.6766	0.6623	0.3076	0.4660	0.3673	0.5394	1.0000	
	0.0001	**0.0001**	**0.0001**	**0.0036**	**0.0001**	**0.0004**	**0.0001**		
DAS total	0.1245	0.1850	-0.0191	0.0020	0.0373	0.0276	-0.0245	0.0867	1.0000
	0.2479	0.0844	0.8601	0.9855	0.7301	0.7983	0.8207	0.4220	

PSQI: Pittsburgh sleep quality index; DAS: Death anxiety scale.

When the relationship between patients' sleep quality and death anxiety scores was examined, 28.4% of patients with mild death anxiety, 34.5% of patients with moderate death anxiety, and 37% of patients with severe death anxiety were found to have poor sleep quality. In the study, it was determined that 36.4% of the patients experienced severe death anxiety and 92% had poor sleep quality. These data show that as the patients' death anxiety increased, their sleep quality decreased (Fig. 2). However, it was determined that the relationship between sleep quality and death anxiety was not statistically significant. When the correlations between death anxiety and sleep quality scores were evaluated, it was determined that the correlation between the PSQI and its subcomponents was moderately positive and significant, while the correlation between the PSQI and its subcomponents and the DAS was weakly positive and not significant (Table 3).

Discussion

This study examined the relationship between death anxiety and sleep quality levels experienced by patients with ICDs. This study examines the effects of ICD implantation, which is quite limited in the literature, on patients in the Turkish population, and also evaluates the levels of death anxiety in patients with ICD, which has not been studied before and examines the relationship between these and sleep quality levels, which constitute the strengths and innovations of this study.

Investigation of Patients' Death Anxiety and Sleep Quality According to Sociodemographic and Disease-Related Variables

In our study, the effects of patients' sociodemographic and disease-related characteristics, problems experienced regarding ICD, and physical symptoms experienced on death anxiety and sleep quality levels were also investigated. Among the sociodemographic factors, increasing age causes neurohormonal and degenerative tissue changes in the cardiovascular system. These changes cause a decrease in atrioventricular conduction velocity, a change in heart rate, and a decrease in response to exercise, leading to arrhythmias.[26,27] The high average age of the sample group in our study is associated with this situation. In addition, the majority of male patients in the sample group are associated with the vascular, metabolic, and hemodynamic protective effects of estrogen in the premenopausal period of women.[28]

This study showed that young male patients and patients with poor economic conditions had lower sleep quality levels than other sociodemographic patient groups. Similar to our study results, the study conducted by Habibović et al.[19] reported that 67% of ICD patients had sleep problems, which decreased to 57% over time, but this value was still significant. It was also shown that young male patients had more sleep problems. This shows that sleep problems in patients are not only related to problems related to ICD.

Our study results have shown that single and young female patients have higher death anxiety levels compared to other sociodemographic patient groups. In most studies conducted on this subject, there is no difference in death anxiety between genders. In studies reporting differences, it is reported that women experience more death anxiety than men, in parallel with our results.[29,30] This is associated with women thinking about death more than men. It is also predicted that death anxiety is a phenomenon specific to women and that women report death anxiety more than men; therefore, women have higher death anxiety levels.[29,30] In a study conducted by Vazquez et al.,[31] it was determined that female patients had higher levels of death anxiety and that this situation was statistically significant.

In contemporary western culture and Turkish society, death is defined as the inevitable, the end, and the absence of existence.[32,33] Death is the annihilation of the self; therefore, these definitions show that death is seen as a negative concept for individuals and is an undesirable phenomenon. In addition, death is a phenomenon that significantly affects individuals' life experiences. Therefore, it is inevitable to feel death anxiety, which is seen as an undesirable phenomenon.[33] Templer reported that patients' previous experiences with refer to death also affected death anxiety and that there was no relationship between patients' ages and their death anxiety levels.[21] However, most studies, in parallel with our study, report higher death anxiety levels in younger patients. This is associated with feelings of regret and unlivedness. Therefore, it is predicted that living life to the fullest, having psychological maturity, and frequently encountering the death of loved ones lead to an acceptance of death in the elderly, thus reducing death anxiety.[34,35] A study of ICD patients also showed higher levels of death anxiety in patients under the age of 50.[31]

Arrhythmias triggered by degenerations that increase with age can cause various physical symptoms in patients. Our study results have shown that shortness of breath, chest pain, chest tightness, and sleep problems are among the main symptoms frequently reported. Ineffective circulation and increased blood return to the heart and lungs during sleep cause paroxysmal nocturnal dyspnea and orthopnea, leading to shortness of breath and interruption of patients' sleep. Similarly, the use of diuretic drugs by patients with HF is among the factors that interrupt sleep due to the need to go to the toilet.[36,37] It is reported that the symptoms experienced by patients may also develop due to psychological problems such as anxiety and stress.[38] In a study similar to ours, it was reported that patients most frequently encountered symptoms of sleep problems and dizziness.[39]

Patients in our study reported various problems with the ICD after implantation. These problems were related to the ICD's shocking feature, the fact that life is dependent on the device and that it is activated when there is a rhythm disturbance that can cause death.[17,40] Our study results showed that patients reporting these problems had poor sleep quality and severe death anxiety. These problems were also found to be significantly associated with shock experience and the number of shocks. Palese et al.[41] suggested that this relationship was due to differences in the adaptation stages of individuals to the device depending on shock experience and the number of shocks.

This study showed that patients who experienced shocks had higher death anxiety levels and lower sleep quality levels. A similar study reported that ICD patients had poor sleep quality and that the duration of ICD use and the number of shocks were effective factors in patients experiencing insomnia.[42] In studies, this situation is associated with individuals' anxiety about being shocked again after experiencing a shock.[43,44] It has been determined that patients who cannot experience shock also experience anxiety regarding the uncertainty and unknown nature of the shock. These anxieties experienced by individuals due to the device and shock are mostly associated with problems experienced regarding the ICD and thoughts of perceived loss of control.[45]

Studies have reported that patients who experienced shock encountered 2.2 times more problems and experienced 1.58 times more anxiety than patients who did not experience shock and that patients who reported having problems with their ICD were 4.98 times more likely to experience anxiety than those who did not report.[41,43–45] These problems are also associated with psychological theories such as learned helplessness, classical conditioning, and cognitive evaluation models.[46] It is also thought that the fact that individuals have not had any previous shock experience and therefore have not developed a coping plan is also effective. It is reported that death anxiety develops with being face to face with death.[47] These results support the need for an individualized approach by planning interventions according to patients' shock experiences. It is anticipated that the problems experienced can be minimized by informing the patients and implementing an appropriate management plan.[48]

Examining the Relationship between Sleep Quality and Death Anxiety

Our study results on the relationship between sleep quality and death anxiety levels show that as patients' death anxiety levels increase, their sleep quality levels decrease. When the correlations between sleep quality and death anxiety scores are examined, it is determined that the correlation between PSQI and its subcomponents is moderately positive and significant. The correlation between PSQI and its subcomponents and DAS is weakly positive and not significant. It is predicted that this situation may develop due to environmental and physical factors that cannot be controlled and affect the patients. In addition, it makes it difficult to distinguish sleep and anxiety problems that develop due to patients' comorbid conditions from ICD experiences.

In a study examining the relationship between sleep problems and psychological problems, it was found that sleep problems were related to psychological problems that psychological problems accompanied sleep problems in 40–50% of patients, and that patients with sleep problems had 17 times more anxiety levels than patients without sleep problems.[49] It is also reported that patients with poor sleep quality have increased anxiety levels and reactions to negative stimuli, which can lead to a vicious cycle increase cardiovascular risk factors, and cause diseases.[19,50] A study has shown that 24–87% of ICD patients experience ICD-related anxiety and that this, along with insomnia, negatively affects patients' lives and treatments.[51]

Limitations of the Study

The research is a cross-sectional study; consequently, the findings are limited to the city and center where the study was conducted. In addition, the findings are descriptive rather than predictive. The patients' existing cardiovascular diseases and comorbid conditions also make it difficult to distinguish ICD experiences. In addition, it was not possible to distinguish the effects of sleep problems such as sleep apnea or hypersomnia on patients' sleep quality levels.

Conclusion

In our study, it was determined that the presence of ICD causes death anxiety and poor sleep quality, and these two phenomena can affect each other. Increased insomnia and anxiety can trigger cardiovascular diseases, and these diseases can trigger sleep quality and death anxiety levels. This situation can turn into a vicious circle over time. Therefore, our study has shown that these two phenomena should be evaluated by health professionals. In addition, it has been shown that patients' sleep quality and death anxiety levels change with their experiences. Therefore, it is recommended that these cases be evaluated during routine check-ups following cardiac conditions and at least once a year. In addition, young female patients in terms of death anxiety, young male patients in terms of sleep quality individuals with low economic status, and individuals experiencing ICD-related problems should be evaluated first and more frequently as they are in the risk group. Nurses primarily undertake duties in holistically evaluating patients, maintaining health, ensuring adaptation, improving medical outcomes and increasing quality of life, and strengthening patients' ability to cope with their current illness and the problems caused by the illness. Psychiatric nurses and consultation liaison psychiatric nurses in particular undertake major roles and responsibilities in evaluating patients' psychosocial problems such as death anxiety and sleep quality, ensuring adaptation, and improving coping. It is thought that effective and holistic nursing care can be achieved by informing patients about how the ICD works, its functions, shocking and coping with anxiety, and by creating an appropriate management plan. In this way, it is anticipated that psychosocial problems that patients frequently encounter, such as death anxiety and sleep quality, can be improved.

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