Effects of pre-operative individualized education on anxiety and pain severity in patients following open-heart surgery

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ABSTRACT

Objectives: Individualized education is important for preparing patients for the operation both physically and psychologically. This study investigated the effects of pre-operative individualized education for open-heart surgery patients on post-operative anxiety and pain severity.

Methods: This quasi-experimental study was conducted in a university hospital between January and October 2014 and involved 109 patients. Data were collected through a form developed by the authors, the State-Trait Anxiety Inventory (STAI), and the visual analog scale (VAS). Patients underwent STAI 1 day before the operation to identify their sources of anxiety and educational needs, and then individualized education was given accordingly. 1 day after the operation, STAI was used to measure patients' state anxiety level, and VAS was used to measure their pain level. The effect of demographic variables on differences in anxiety and pain was investigated.

Results: The average age of the participants was 59.62; 69.7% were male, 92.7% were married, 49.5% graduated from primary school, and the majority (71.6%) had coronary heart disease. The most common sources of anxiety reported the participants included lack of knowledge, being away from family, risk of death, and pain. An analysis of the participants' pre-operative mean scores for state anxiety displayed statistically significant differences ($P < 0.05$) according to age groups and gender. No significant difference was detected between mean pre- and post-operative state anxiety scores. There was a statistically significant relationship between mean pre- and post-operative state anxiety scores and mean pain scores.

Conclusions: The individualized education is given to patients before surgery was found to have potential effects on their post-operative pain levels.

Keywords: Anxiety- pain, individualized patient education, nursing, open-heart surgery

Introductıon

Cardiovascular diseases are ranked first among all causes of death worldwide.[1,2] The World Health Organization reported that an estimated 17.5 million people lost their lives due to cardiovascular diseases in 2012, and more than 23 million annually might lose their lives by 2030.[2] Surgical treatments still have important roles in prolonging life and increasing quality of life in heart disease patients.[3,4]

Heart surgeries cause emotional, cognitive and physiological reactions in patients.[4] Patients undergoing surgical intervention usually experience worries over outcomes such as becoming permanently disabled, loss of control over their body, loss of working ability, pain, loss of sexual ability, inability to wake up from anesthesia, and fear of death. Due to fear and anxiety, majority of patients have difficulty in coping with the operation process. Not having information about the diagnosis and treatment methods, patientsmay experience anxiety, including depression, in the pre-operation period.[4-7] Krannich et al. reported that 34% of patients who underwent coronary artery bypass graft (CABG) surgery experienced pre-operative anxiety, 24.7% experienced post-operative anxiety, and 16.5% experienced both pre- and post-operative anxiety.[8] In addition, some studies have shown that some sociodemographic characteristics such as age, gender, and marital status affect the pre- and post-operative anxiety.[9-16] While some studies[10,12] have indicated that age did not affect mean pre-operative state anxiety scores, some other studies[15,16] have shown that age affected anxiety level. The related literature indicates that

women's state anxiety scores were higher than those of men before a heart operation.[9,11-14,16] Furthermore, some studies have indicated effects of marital status on anxiety levels; single individuals might experience more anxiety due to factors such as insufficient support and feelings of loneliness.[17,18] In the literature patients' anxiety score decreased with the decrease in post-operative pain scores.[15,19]

Informing and educating patients are important for preparing them for the operation both physically and psychologically. Consultation and education before open-heart surgeries are reported to decrease patients' worries and fears, reduce the need for analgesics after the operation by decreasing pain, prevent post-operative complications such as nausea and vomiting, and shorten hospital length of stay by enhancing recovery speed after the operation.[5,6,19,20]

The related literature reports that with individualized care and education, patients' anxiety decreases and their satisfaction increases.[21,22] Individualized care is defined as "the adaptation of nursing care according to the "beliefs, values, emotions, thoughts, preferences, experiences, and perceptions of the individual.[23]"

Nurses, who have roles in patients' diagnosis, treatment and care and are in constant communication with them, play an active role in patient education.[24,25] According to Ministry of Health Nursing Regulations in Turkey, patient education is a legal duty of nurses.[26] With their roles as consultants and educators before the operation, nurses can contribute to positive patient outcomes and rapid recovery by decreasing patients' anxiety through the individualized care they provide before and after the operation.[6,10,16,19,21,27-29]

In Turkey, individualized pre-operative education for determining pre-operative information requirements is generally not given. Very little research has been conducted to measure the effects of individualized education on anxiety or/ and pain levels of patients having open-heart surgery. Likewise, reports on the effects of demographic variables on differences in anxiety and pain in open-heart surgery are also lacking. Therefore, one of the main reasons for carrying out this study was to close this knowledge gap. The purpose of this study was to identify the effects of pre-operative individualized education given to patients before open-heart surgery on post-operative anxiety and pain levels.

Methods

Patient features

This study is quasi-experimental in nature, was conducted in the adult cardiovascular surgery service and intensive care unit of a foundation university hospital between January and October of 2014. According to 2011–2012 data from the hospital where the study was conducted, 300 patients underwent open-heart surgery. Sample size and power analysis of the study were calculated using a paired-sample t-test and G-Power 3.1.3 version program, and 109 patients were included in sampling (with $\alpha = 0.05$ and 95% power $(1\beta–\beta = 0.95)$. The study involved Turkish-speaking patients who were 18 years old and over and underwent open-heart surgery. Patients who underwent heart transplantation, were diagnosed with a psychiatric disease, had orientation problems, had complete vision or hearing loss, or had problems in mental processes due to such problems as dementia and mental deficiency were not included in the study.

Instruments and analysis

Data collection tools
Demographic and background data were collected using 25 items developed by the researchers in light of the related literatüre.[4,5,14,19] Further data were collected using the State-Trait Anxiety Inventory (STAI) and visual analog scale (VAS).

STAI

The STAI was developed by Spielberger *et al*. Öner and Le Compte designed the Turkish adaptation and confirmed the reliability and validation of the inventory.[30] It comprises the state anxiety ınventory, which includes 20 items and identifies how individuals feel at a specific moment and under specific conditions, and the trait anxiety ınventory, which includes 20 items and identifies how individuals feel in general. Higher scores indicate a high anxiety level, and low scores show a low anxiety level.[30] Study participants were asked to indicate on a 4-point Likert scale (1 = not at all, 4 = very much so) how they felt on the day before surgery and were also asked to answer 1 day after the surgery. Cronbach's alphas for the state anxiety ınventory and trait anxiety ınventory were 0.921 and 0.846, respectively.

VAS

The participants' pain levels were identified using VAS, a 10-cm ruler that indicates "no pain" and "extreme pain" on both sides.[31,32] The participants were asked to mark on the ruler according to the severity of their pain.

Data collection process

The study was conducted in two stages:
- First stage
  In the pre-operative period, data on the participants were collected using a data collection form created by the authors and STAI. Sources of anxiety were identified before the operation, and participants were given individualized education and pre-operative care according to their needs. The education was given in the participant's room by the researcher. Individual interviews with patients were conducted to determine demographic data (e.g., age, gender, and educational status), any information the patient

may not have been given, and anxiety sources (e.g., being away from family, risk of death, pain, discomfort, and loss of privacy), and education was given according to their needs. The education took about 30–90 min, depending on the patient's needs. It included physical and psychological preparation before the operation, the process of going to the operation, and the features of the operating room and the intensive care unit.

- Second stage

After the participants were extubated within the 24 h following the operation, when they became conscious and could communicate verbally, they were administered the state anxiety ınventory to assess their anxiety level and VAS to assess their pain level. Because the trait anxiety ınventory was taken before the operation, it was not measured after the operation. Pain level was assessed hourly within the first 2 h when the patient was awake (after s/he was extubated); it was then assessed once every 2 h. Patients verbally expressed satisfaction with the education that had been designed in consideration of their individual characteristics and anxiety sources.

Data analysis

The data were analyzed using Statistical Package for the Social Sciences 20 program. Descriptive features were analyzed using numbers, percentages, means, and minimum, and maximum values. The difference between the groups was evaluated using Kruskal–Wallis and Mann–Whitney U-tests. Pre- and post-operative state anxiety scores were evaluated using Wilcoxon Test; relationships between the variables were evaluated using Pearson Correlation Coefficient Test, and the difference between the groups in nominal variables was performed using Chi-square test. Significance level was taken as 0.05. The difference was statistically significant when $P < 0.05$.

Ethical considerations

Approval was obtained from the research board and Ethical Committee of the university where the study was conducted (approval: 18.12.2013, Project Number: KA 13/303). The participants were given verbal and written information, and their written consent was obtained.

Results

The participants' descriptive characteristics and sources of anxiety are presented in Table 1. Pre-operative sources of anxiety were found mainly as lack of knowledge (70.6%), being away from family (21.1%), risk of death (16.5%), and pain (15.6) [Table 1].

Table 2 summarizes findings in relation to the state of health and whether the participants were satisfied with the education given to them. After the operation, 95.4% of the participants reported that they were satisfied with the education given

Table 1: Participants' descriptive characteristics and sources of anxiety (n=109)

Descriptive characteristics	
Age $\bar{X} = 59.62 \pm 11.45$ (minimum=21, maximum=83)	
Participants' characteristics	***n* (%)**
Gender	
Female	33 (30.3)
Male	76 (69.7)
Marital status	
Married	101 (92.7)
Single/divorced	8 (7.4)
Employment status	
Working	35 (32.1)
Not working (retired, housewife, unemployed)	74 (67.9)
Operation type	
CABG (CHD)†	78 (71.6)
Heart valve operation	24 (22.0)
Aneurysm repair (Bentall)	7 (6.4)
Have had an operation before	
Yes	69 (63.3)
No	40 (36.7)
Sources of anxiety‡	
Lack of knowledge	77 (70.6)
Being away from family	23 (21.1)
Risk of death	18 (16.5)
Pain	17 (15.6)
Discomfort§	11 (10.1)
Loss of privacy	11 (10.1)
Impairment of body image	10 (9.2)
Complication development	10 (9.2)
Anesthesia/inability to wake up from anesthesia	10 (9.2)
Loss of control over body	9 (8.3)
Loss of working ability	8 (7.3)
Becoming permanently disabled	3 (2.8)

†Coronary bypass graft (coronary artery disease); participants gave more than one response, §discomfort caused by feeling cold, nausea, catheter, or insertion of drain and catheter

before the operation. They reportedly remembered the information given, did not have difficulty in adapting to the intensive care unit environment, and applied the respiration and coughing exercises as instructed [Table 2].

The participants' mean pre-operative state anxiety score was 34.34 ± 9.03 (minimum = 20, maximum = 62) and their mean trait anxiety score was 37.98 ± 8.28 (minimum = 22, maximum = 62). Their mean post-operative state anxiety score was 35.94 ± 8.92 (minimum = 21, maximum = 65). No significant difference was identified between mean pre- and post-operative state anxiety scores ($P > 0.05$).

While there was no significant relationship between the participants' mean pre-operative trait anxiety scores and mean

Table 2: Participants' post-operative state of health and satisfaction with the education given (n=109)

Participants' post-operative state of health	n (%)
Duration of intensive care stay	
1–2 days	12 (11.0)
3–4 days	73 (67.0)
5–6 days	18 (16.5)
7 days or more	6 (5.5)
First mobilization	
Post-operative 1st and 2nd day	71 (65.1)
3rd day or later	38 (34.9)
Nausea/vomiting	
Experienced	12 (11.0)
Not experienced	97 (89.0)
Sufficient sleep	
Yes	71 (65.1)
No	38 (34.9)
Reasons for insufficient sleep†	
Problems/reasons related to respiration (respiration exercises, extubation process, discomfort caused by intubation)	24 (22.0)
Intensive care environment (sounds, routine procedures)	6 (5.5)
Pain	5 (4.6)
Anxiety (feeling agitated, uneasy)	3 (2.8)
Satisfaction with the education given before the operation	
Satisfied	104 (95.4)
Not satisfied	5 (4.6)

†Percentages are indicated as a percentage of the number of participants who reported insufficient sleep

VAS pain scores ($P > 0.05$), there was a statistically significant relationship between mean pre- and post-operative state anxiety scores and mean VAS pain scores ($P < 0.05$). There was a positive relationship between pre- and post-operative state anxiety scores and mean VAS pain scores ($r = 0.31$; $r = 0.19$, respectively). Mean VAS pain score increased with the increase in state anxiety scores.

An analysis of the participants' mean pre-operative state anxiety scores according to age groups displayed statistically significant difference ($P < 0.05$). Mean pre-operative state anxiety score of those aged between 58 and 69 was found 32.56 ± 8.92; and mean state anxiety scores of those aged between 70 and 83 (37.17 ± 10.32) were lower than those of the participants aged between 22 and 45 (38.38 ± 8.85). A significant difference was found between mean pre-operative state anxiety scores and variables such as gender, post-operative mobilization, and sleep state ($P < 0.05$) [Table 3].

An analysis of the participants' mean VAS scores according to their descriptive features/state of health [Table 3] displayed a significant difference between mean VAS pain scores according to gender ($P < 0.05$); mean VAS pain scores of female participants (1.98 ± 1.09) were higher than those of males (1.43 ± 0.89).

An analysis of the participants' mean pre- and post-operative state anxiety scores according to sources of anxiety showed that mean state anxiety scores of the participants having lack of knowledge before the education (37.66 ± 9.08) were higher than those of participants having knowledge (32.96 ± 8.69) ($P < 0.05$). Pre-operative state anxiety scores of the participants who mentioned discomfort as a source of anxiety (28.73 ± 7.28) were lower than those who did not mention it (34.97 ± 9.02) ($P < 0.05$). Mean post-operative state anxiety scores of the participants who were worried about privacy issues (36.80 ± 8.88) were higher than those who were not worried (28.36 ± 5.03) ($P < 0.05$) [Table 4].

Discussion

In our study, the participants' sources of anxiety were identified as lack of knowledge, being away from family, risk of death, pain, discomfort, loss of privacy, impairment of body image, and fear of complications and anesthesia/inability to wake up from anesthesia. The patient's awareness of the key role of the heart is reported to increase the risk of pre- and post-operative anxiety in heart operations.[33,34] Pain and discomfort caused by the operation, physical limitations and immobility following the operation, uncertainty about getting better, risk of complication development, sleep problems, unfamiliar environment, unfamiliar faces, and loss of autonomy and privacy are indicated as factors causing anxiety and stress in patients.[35-38] Waiting for the operation, having an operation, experiencing discomfort or pain, being away from home or work, and fearing possible death as a result of the operation are also reported as pre-operative anxiety sources.[5] Because the hospital where the study was conducted did not keep patients waiting for an operation for extended periods, "waiting for the operation" was not mentioned as a source of anxiety in our study. Pre-operative anxiety sources of the present study are parallel with the related literatüre.[5,35,38]

The majority of patients in this study reported that they had a sufficient sleep in the intensive care unit after the operation. Their sleep problem reportedly was caused mainly by respiration-related problems. Pain is reported to affect the sleep pattern of 73.1% of the patients who underwent heart surgery.[39] The patients in this study might have had a sufficient sleep because before the operation they had been informed about the intensive care environment (sounds of devices, personnel talking, lighting, and ventilation), equipment (e.g., ventilator, infusion pumps, catheters, chest tube, central catheters, and urine catheter), and practices (monitoring, intubation, extubation, and aspiration).

Of all the participants in our study, 95.4% stated that they were satisfied with the education given before the operation, remembered the information given, did not have difficulty in adapting to the intensive care environment, and applied the respiration and coughing exercises instructed. Jlala *et al.* found that 90% of the patients given education through video

Table 3: Mean pre- and post-operative state anxiety ınventory scores and mean VAS pain scores according to descriptive features and health state of the participants (*n*=109)

Descriptive features	n	Before the operation			After the operation					
		SAI			SAI			VAS		
		X±SD	Range	z-score/*P* value	X±SD	Range	z-score/*P* value	X±SD	Range	z-score/*P* value
Age										
22–45	13	38.38±8.85	23–50	z=7.86	35.62±8.29	23-48	z=4.94, P>0.05**	1.84±1.44	0.50–4.92	z=0.27 P>0.05**
46–57	19	34.42±7.03	24–50	P<0.05**	37.79±8.56	28-61		1.65±0.90	0.58–4.42	
58–69	59	32.56±8.92	20–62		34.85±9.58	21-65		1.51±0.78	0.00–3.17	
70–83	18	37.17±10.32	20–58		37.83±7.43	26-54		1.64±1.30	0.50–6.33	
Gender										
Female	33	38.88±7.5	27–58	z=−3.77 P<0.05*	38.45±10.0	23-65	z=−1.88 P>0.05*	1.98±1.09	0.5–4.92	z=−2.56 P<0.05*
Male	76	32.37±8.96	20–62		34.86±8.21	21-61		1.43±0.89	0–6.33	
Marital status										
Married	101	33.94±9.01	20–62	z=1.72 P>0.05*	35.26±34	65-8.32	z=2.44 P<0.05*	1.57±0.93	0.33–6.33	z=0.35 P>0.05*
Single/divorced	8	39.38±8.14	30–55		44.63±41.5	65-12.08		1.91±1.56	0–4.92	
Education level										
Primary school	54	33.48±9.21	20–58	z=4.87 P>0.05**	34.52±8.55	21-65	z=3.38 P>0.05**	1.68±1.06	0.42–6.33	z=1.81 P>0.05**
Secondary school	11	32.64±8.48	23–47		35.45±6.11	27-44		1.24±0.60	0.42–2.67	
High school	16	32.63±6.59	24–45		37.00±11.08	26-65		1.71±1.09	0.50–4.92	
University	28	37.64±9.64	20–62		38.29±9.09	23-59		1.50±0.90	0.00–4.42	
Income level										
Income<expenses	35	35.14±8.99	20–58	z=2.53 P>0.05**	34.74±7.33	21-52	z=0.30 P>0.05**	1.68±1.29	0.42–6.33	z=0.11 P>0.05**
Income=expenses	62	34.58±8.83	21–62		36.53±10.02	22-65		1.56±0.86	0.00–4.42	
Income>expenses	12	30.75±10.07	20–47		36.42±7.20	28-50		1.51±0.55	0.67–2.33	
Have had an operation before										
Yes	69	34.87±9.27	20–62	z=−0.89 P>0.05*	36.65±9.34	22-65	z=−1.30 P>0.05*	1.62±0.96	1.50±4.92	z=−0.49 P>0.05*
No	40	33.43±8.63	24–58		34.73±8.12	21-54		1.55±1.05	1.42±6.33	
Accompanying disease										
Yes	82	34.32±9.17	20–62	z=0.02 P>0.05*	36.28±9.37	22-65	z=−0.27 P>0.05*	1.61±0.97	1.50±6.33	z=−0.65 P>0.05*
No	27	34.41±8.75	24–55		34.93±7.47	21-50		1.56±1.05	1.25±4.92	
Health status										
First mobilization										
1–2 days	71				33.77±7.02	22-54	z=3.29 P<0.05*	1.47±0.81	0–4.42	z=1.35 P>0.05*
3 days and more	38				40±10.64	21-65		1.84±1.22	0.5–6.33	
Having sufficient sleep										
Yes	71				33.79±7.97	21-61	z=3.64 P<0.05*	1.55±0.89	0–4.92	z=0.24 P>0.05*
No	38				39.97±9.31	27-65		1.68±1.15	0.42–6.33	

SAI: State anxiety ınventory, VAS: Visual analog scale, SD: Standard deviation,*Mann–Whitney *U*-test, **Kruskal–Wallis test

before the operation reported satisfaction with the education and considered the information and the video in the education a valuable source.[14] The participants' remembering the pre-operative personal needs-based individualized education might

Table 4: Mean State-Trait Anxiety Inventory scores of the participants according to some sources of anxiety (n=109)

Sources of anxiety	Pre-operative SAI				Post-operative SAI		
	n	X±SD	Range	z-score/P value*	X±SD	Range	z-score/P value*
Lack of information							
Yes	77	32.96±8.69	20–62	z=2.62 P<0.05	35.69±9.54	21–65	z=1.18 P>0.05
No	32	37.66±9.08	21–55		36.56±7.32	23–54	
Discomfort**							
Yes	11	28.73±7.28	20–41	z=2.17 P<0.05	35.18±10.76	23–65	z=0.54 P>0.05
No	98	34.97±9.02	20–62		36.03±8.76	21–65	
Loss of privacy							
Yes	11	31.27±6.81	20–39	z=1.08 P>0.05	28.36±5.03	21–37	z=3.33 P<0.05
No	98	34.68±9.21	20–62		36.80±8.88	22–65	
Being away from family							
Yes	23	33.30±7.49	22–50	z=0.45 P>0.05	36.09±8.95	22–59	z=−0.21 P>0.05
No	86	34.62±9.41	20–62		35.91±8.97	21–65	
Pain							
Yes	17	33.06±9.27	20–52	z=0.69 P>0.05	35.35±9.79	22–61	z=0.59 P>0.05
No	92	34.58±9.01	20–62		36.05±8.81	21–65	
Risk of death							
Yes	18	37.17±8.87	23–55	z=−1.47 P>0.05	37.89±9.61	26–61	z=−0.94 P>0.05
No	91	33.78±9.00	20–62		35.56±8.79	21–65	
Loss of control over body							
Yes	9	36.11±4.78	26–43	z=−0.92 P>0.05	38.78±6.55	30–52	z=−1.52 P>0.05
No	100	34.18±9.31	20–62		35.69±9.09	21–65	
Loss of working ability							
Yes	8	38.50±8.57	26–50	z=−1.48 P>0.05	41.13±7.94	30–54	z=−1.93 P>0.05
No	101	34.01±9.02	20–62		35.53±8.90	21–65	
Impairment of body image							
Yes	10	37.00±10.04	20–55	z=0.96 P>0.05	37.80±10.75	22–52	z=−0.57 P>0.05
No	99	34.07±8.93	20–62		35.76±8.76	21–65	
Complication development							
Yes	10	38.50±12.02	21–52	z=−1.32 P>0.05	39.60±13.29	23–65	z=−0.80 P>0.05
No	99	33.92±8.64	20–62		35.58±8.37	21–65	
Anesthesia							
Yes	10	38.10±11.57	21–58	z=−1.16 P>0.05	34.60±8.59	22–54	z=0.40 P>0.05
No	99	33.96±8.71	20–62		36.08±8.99	21–65	
Becoming permanently disabled							
Yes	3	41.00±8.72	31–47	***	43.33±2.08	41–45	***
No	106	34.15±9.00	20–62		35.74±8.96	21–65	

SAI: State anxiety inventory, *Mann–Whitney U-test, SD: Standard deviation, **discomfort caused by feeling cold, nausea, catheter, or insertion of drain and catheter, ***The test could not be performed as the number of participants in groups was fewer than 5

have increased their satisfaction and had positive effects on their adaptation to the post-operative period.

Some studies[6,9,10,14,16,29] have found that pre-operative education given to patients decreased anxiety level while some other studies[7,19,27,40-42] indicated that it did not decrease anxiety levels. In our study, the participants' significantly lower mean post-operative state anxiety scores are considered to result from the needs-based individualized education they received.

This study found that there was a statistically significant relationship between mean pre- and post-operative state anxiety scores and mean VAS pain scores ($P < 0.05$). One study reported that pre-operative anxiety in patients who underwent a heart operation significantly increased the post-operative pain level and consumption of analgesic.[15] Özalp et al. also found that post-operative pain severity and analgesic consumption increased with the patients' pre-operative state anxiety scores.[43] Consistent with the study of Özalp et al., pre- and post-operative state anxiety scores increased with the increase in mean VAS pain score in our study.

While some studies indicated that age did not affect mean pre-operative state anxiety scores,[10,12] some other studies showed that age affected anxiety level.[15,16] This study found a statistically significant difference between the participants' age groups and mean pre-operative state anxiety scores ($P < 0.05$). Pre-operative state anxiety scores of the participants aged between 58 and 69 were significantly lower than those of the participants in the 70–83 years old and 22–45 years old age groups. Similar to the findings of this study, Krannich et al. reported higher pre-operative anxiety levels in young patients undergoing CABG.[8] Deyirmenjan et al. found that pre-operative anxiety in patients who underwent open-heart surgery increased with increasing age.[11] Higher state anxiety scores of the young and old participants in this study might result from young people's having expectations from life and plans for the future, and old people have physical disorders (such as hypertension and diabetes mellitus).[44,45]

The related literature[9,11-14,16] indicates that women's state anxiety scores were higher than those of men before a heart operation, which is consistent with our results. It has been stated that women experience more anxiety due to biological, cultural and social factors.[46] The high pre-operative state anxiety scores of the women in our study might have resulted from these factors.

An analysis of post-operative state anxiety scores showed statistically significant differences according to marital status. The related literature indicates effects of marital status on anxiety levels; single individuals might experience more anxiety due to factors such as insufficient support and feelings of loneliness.[17,18] The lower post-operative state anxiety scores of married participants in this study compared with single

participants might result from married participants having more sources of support.

The difference between post-operative state anxiety scores according to sleep state of the participants in the intensive care unit was statistically significant. Ede´ll-Gustafsson and Hetta reported that patients with high state anxiety scores indicated changing position and the pain experienced while changing position as factors interrupting their sleep.[47] This study found that participants who had high state anxiety scores also had poor sleep quality. In participants with lower mean post-operative anxiety scores, better sleep quality may have contributed their lower scores. The related literature indicates that the way pain is defined changes according to cultures.[48] Studies conducted in Turkey indicate that women have less tolerance for pain and expressed it more.[48,49] Hence, VAS pain scores of the women in this study were higher than those of men ($P < 0.05$). A study conducted in various cultures reported no significant difference in mean VAS pain scores between female and male patients who underwent an open-heart operation.[50]

The limitation of this study is that there was no control group to compare against the pre- and post-operative state anxiety scores of the patients who were provided with individualized education and routine care.

Conclusion

Regardless of age, female patients in this study were more likely to experience anxiety. However, our study showed that pre-operative individualized education could reduce post-operative pain levels in both sexes. The main sources of pre-operative anxiety were lack of knowledge, being away from family, risk of death, pain, discomfort, loss of privacy, and impairment of body image.

Acknowledgments

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