Pain Characteristics and Pain Interference Among Patients Undergoing Open Cardiac Surgery

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Purpose: *The aim of this study was to analyze postoperative pain severity, pain characteristics, and factors that affect pain for patients undergoing open cardiac surgery.*
Design: *A descriptive, cross-sectional study design was used.*
Methods: *This study was conducted on 70 patients who underwent open cardiac surgery at a state hospital in North Cyprus. Data were gathered using the Patient Information Form and Brief Pain Inventory-Short Form.*
Findings: *Patients who underwent open cardiac surgery experienced severe pain. Postoperative pain had a negative impact on deep breathing, coughing, and physical exercise. The patients' postoperative pain severity and postoperative pain interference show a statistically significant relationship between gender, alcohol consumption, prior surgical experience, and satisfaction with pain management* ($P < .05$). *A moderately positive and statistically significant correlation was found between the worst pain intensity of the patients in the last 24 hours and their pain interference* ($P < .05$).
Conclusions: *Patients with open cardiac surgery experienced severe pain that restricted their activities. Patients should be informed about pain characteristics they will experience and effective pain management methods to reduce pain.*

Keywords: *open cardiac surgery, pain severity, pain characteristics, pain interference.*

PAIN IS A MULTIDIMENSIONAL and complex experience that leads to suffering and a decrease in life quality of individuals. The International Association for the Study of Pain has defined pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage."[1]

Acute pain is not only the most experienced type of pain but also a widespread phenomenon during the postoperative period.[2] Postoperative pain is a relatively short-term acute pain type, which starts with surgical trauma and ends with tissue treatment. It is mostly highly localized acute pain, which is related to the degree of surgical trauma and the type and width of incision.[3]

Annually, millions of people worldwide undergo surgery and experience postoperative pain. In 2012, approximately 313 million surgical operations

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were performed worldwide.[4] Despite improved understanding of pain mechanisms, increased awareness of the prevalence of postoperative pain, advances in pain management approaches, and attempts to improve pain-related outcomes, inadequately controlled postoperative pain is still a widespread and unresolved health problem.[5] Gan et al[6] reported that approximately 86% of patients experienced acute pain after surgery and 75% of these patients had moderate, severe, or extreme pain. In addition, most of the participants in study experienced severe pain after discharge. Buvanendran et al[7] found that 66% of patients had moderate, severe, or extreme pain after surgery, whereas 59% of patients had moderate, severe, or extreme pain during the first 2 weeks after discharge.

Open cardiac surgery is a stressful procedure during which postoperative pain affects and limits the daily life activities of patients. The sternotomy approach used in open cardiac surgeries is the main reason for postoperative pain. Surgical trauma, tissue damage, and release of inflammatory mediators lead to the development of pain in patients with open cardiac surgery.[8] Various studies report that between 47% and 75% of all surgical patients experience significant postoperative pain of cardiac surgery.[9] A study that analyzed acute pain incidence, pain severity, and risk factors on the fourth postoperative day found that postoperative pain was severe at rest in 49%, during coughing in 78%, and on movement in 62% of patients who underwent open cardiac surgery.[10] Watt-Watson et al[11] analyzed pain characteristics of 406 patients who underwent coronary artery bypass graft (CABG) surgery during the first five postoperative days and found that 69% to 80% of CABG patients had moderate to severe pain. Another study that monitored 1,247 patients after cardiac surgery found that more than 65% of patients had moderate to severe pain in the first week after surgery, whereas 10% of patients had pain for the first 2 years after surgery.[12] Milgrom et al[13] measured pain levels for five activities expected of 705 patients who underwent cardiac surgery and found that the mean pain score was the highest for coughing, followed by moving or turning in bed, getting up to a chair or walking, and deep breathing. Another study analyzed pain characteristics of 460 patients with open cardiac surgery and found that postoperative pain remained in the moderate to severe range across day 1 (85%) to day 4 (57%), mainly around the chest incision area, for 70% of patients. The study also found that lower age, female gender, preoperative pain, and analgesic intake had a significant impact on worse postoperative pain ratings.[14]

Ineffective pain management during the postoperative period has a significant impact on the healing process and the physiological results of patients with open cardiac surgery.[15] Uncontrolled postoperative pain is related to the activation of the sympathetic nervous system and surgical stress response. This response may lead to postoperative complications such as myocardial ischemia, hypercoagulability, cardiac arrhythmia, pulmonary complications, delirium, and wound infection.[5,8] Insufficient postoperative pain control leads to a delay in patient mobilization, thromboembolic and pulmonary complications, increase in length of hospitalization or stay in intensive care unit, increased rehospitalization rate, decrease in life quality, and development of chronic pain.[2,9]

Pain increases morbidity and mortality rates if not properly diagnosed and treated.[5] Ineffective postoperative pain management methods may hinder the patient's ability to breath, cough, and move, which in turn, may result in the development of postoperative complications.[15]

Sternal surgical incisions and intercostal catheters lead to immobility in open cardiac surgeries. Pain may restrict ventilation, deep breathing, and coughing, possibly leading to atelectasis and respiratory infections by decreasing lung capacity.[16] Early mobilization, deep breathing, and coughing exercises and pain management are vital to prevent the development of postoperative complications and to speed up the recovery period after open cardiac surgery.[2,6] Existing studies show the importance of determining pain severity and observing pain symptoms to cope with pain in an effective way.[17,18] The most important role of nurses in effective pain management is to evaluate pain and effectiveness of treatment. When evaluating pain, the area where the patient feels pain, and the severity, type, and duration of pain should be analyzed together with factors that cause pain.[19,20]

Patients are unaware of the recovery period from pain, length of time it takes to resume normal

activities, and symptoms that require follow-up with health care personnel. For this purpose, nurses should incorporate education of patients before and during hospitalization to better prepare the patients for the postoperative care period.[20] Individual education for the patient to manage pain is required for effective nursing care. For individual patient education, nurses should evaluate the extent of pain, the area where the patient feels pain, and the severity, type, and duration of pain to understand the impact of postoperative pain on the patient's daily functioning. Patients expect to experience pain after surgery, but nurses can teach them about appropriate levels of pain and the need to manage pain so that they can resume their normal activity. This will result in better pain management, activity promotion, and complication reduction.

Aim

The aim of this study is to describe postoperative pain severity, its characteristics, and factors that influence pain in patients who undergo open cardiac surgery in the Department of Cardiothoracic Surgery at Lefkoşa Burhan Nalbantoğlu State Hospital, Turkish Republic of Northern Cyprus (TRNC).

Research Questions

1. What is the severity of postoperative pain for patients?
2. What are the pain characteristics of patients?
3. What are the impacts of postoperative pain on activities of patients?
4. Do the sociodemographic characteristics of patients have an influence on the patients' pain severity, mood, relations with other persons, sleep, enjoyment of life, and general activity on the first postoperative day?

Methods

Design

A descriptive, cross-sectional study design was used.

Setting

The study was conducted between January 26 and June 27, 2017, in the Department of Cardiothoracic Surgery at a state hospital in TRNC. The Department of Cardiothoracic Surgery has 16 beds with 17 nurses working in three shifts a day (7 a.m. to 2 p.m., 2 p.m. to 9 p.m., and 9 p.m. to 7 a.m.). The department does not use any standard pain evaluation forms or pain management protocols. Evaluations of postoperative pain are recorded using a nurse's observation form. Nurses record the analgesics used in the observation form.

Sample

The research participants were patients who underwent open cardiac surgery at the Department of Cardiothoracic Surgery in a state hospital. The number of patients at the Department of Cardiothoracic Surgery of the state hospital in 2015 was 120. Patients who underwent open cardiac surgery 6 months after necessary permissions were obtained and those who met the inclusion criteria were included. Only patients older than 18 years, who agreed to participate, and could respond to the research directives were included in the study. A total of 83 patients had open cardiac surgery at the Department of Cardiothoracic Surgery between January 26 and June 27, 2017, during which the study was conducted; of these, 70 patients met the inclusion criteria. Thirteen of these patients were excluded (mortality, n = 5; mental retardation, n = 2; rejected to participate in the research, n = 6). The rate of participation in the study was 84.3%.

Data Collection and Instruments

The data used in the study were gathered using the "Patient Information Form," and Brief Pain Inventory-Short Form (BPI-SF)

Patient Information Form

This form was prepared by the researcher using the relevant literature[20-25] and comprised 26 questions about descriptive and clinical characteristics such as age, gender, profession, factors about pain, and length of stay in intensive care unit.

Brief Pain Inventory-Short Form

The BPI-SF was first used by Zalon[26] to evaluate postoperative pain. The reliability and validity of the BPI-SF for postoperative pain in patients who undergo CABG surgery have been assessed. The

reliability and validity of the Turkish version of the BPI-SF have been evaluated by Dicle et al.[25] The BPI-SF consists of four items on pain severity (pain severity subscale) and seven items on the patient's daily functioning (pain interference subscale). The patient is asked to rate their worst, least, average, and current pain intensity in the last 24 hours on a 10-point scale, in which 0 indicates no pain and 10 refers to the worst pain. The pain expressed by the patient refers to the effects of pain on general activity, mood, relations with other people, walking ability, sleep, and enjoyment of life in the most recent 24-hour period. In addition, the BPI-SF asks patients to shade in areas affected by postoperative pain on a picture of the body to evaluate the percentage of relief in pain in the last 24 hours after the use of medicines and methods of pain relief. Cronbach's α values for the reliability of the BPI-SF was 0.79 for the severity subscale and 0.80 for the interference subscale.[25] The present study found that Cronbach's α value was 0.85 for the BPI-SF in general, 0.87 for the severity subscale, and 0.82 for the interference subscale.

Procedure

The data were gathered by the researchers. Patients who met inclusion criteria were informed about the aims and methods of the research. Data were collected by face-to-face interview during the first 24 hours after the participants were transferred from the cardiovascular surgery intensive care unit to the clinic. The data collection process took 15 to 20 minutes.

Ethical Considerations

To conduct this research, ethics approval was obtained from the University Scientific Research and Publication Ethics Board (ETK00-2016-0175), and institutional approval was granted by the Ministry of Health (SAB005-75/1017/371). Written consent of the participants was obtained using an informed voluntary consent form. Participants were also informed that participation was voluntary, and their confidentiality was assured.

Data Analysis

The Statistical Package for Social Sciences (SPSS) 24.0 software program was used for data analyses. Descriptive statistics were used to analyze the sociodemographic characteristics of the patients, their expressions regarding pain, characteristics related to their disease, and scores received by the patients from the BPI-SF. Parametric hypothesis tests were used to analyze normal distribution of the patient scores from the BPI-SF, whereas the Pearson correlation analysis was used to analyze the correlation between variables, and the BPI-SF subscales of pain severity and interference.

Results

Descriptive Characteristics and Patient Characteristics Related to Disease

The average age of the participants was 63.86 ± 9.02 years. Of the group, 72.86% were males, 88.57% were married, 45.71% were graduates of primary schools, and 97.14% did not work. Health histories showed that 48.57% of the patients smoked and 24.29% consumed alcohol. Atherosclerotic cardiovascular disease was the diagnosis in 80.0% of the participants, 85.71% had CABG surgery, 47.14% had prior surgical experience, 47.14% had chronic diseases, and 54.29% had moderately good health status (Table 1).

Postoperative Pain Severity, Pain Characteristics, and Pain Experience

Of the total study population, 58.57% of the participants defined their postoperative pain as achy, 70.0% expressed that coughing increased postoperative pain, 90.0% stated that analgesics decreased postoperative pain, and 94.29% had pain in the sternum incision area. Regarding pain management, 40.0% of the patients stated that the duration of pain treatment was less than 10 minutes, 55.71% of the patients had a pain management satisfaction score between 5 and 7, and 72.86% of the patients were given paracetamol for postoperative pain management (Table 2).

Pain Interference With Activity

The average worst pain intensity score of the participants for the last 24 hours was 7.50 ± 2.15. The analysis of subscales of the BPI-SF shows that the average score obtained from

Table 1. Patient Demographics and Clinical Characteristics (N = 70)

Demographics and Clinical Characteristics	n (%)
Age	
≤65	34 (49)
≥66	36 (51)
Gender	
Female	19 (27)
Male	51 (73)
Marital status	
Married	62 (89)
Single	8 (11)
Educational status	
Did not finish school	12 (17)
Elementary school	32 (46)
Middle school	18 (26)
High school	8 (11)
Smoking	
Yes	34 (49)
No	36 (51)
Alcohol consumption	
Yes	17 (24)
No	53 (76)
Medical diagnosis	
Atherosclerotic heart disease	56 (80)
Others*	14 (20)
Surgical procedure	
Coronary artery bypass graft	60 (86)
Others†	10 (14)
Previous surgery	
Yes	33 (47)
No	37 (53)
Chronic disease	
Yes‡	33 (47)
No	37 (53)
General health status	
Good	29 (41)
Moderate	38 (54)
Poor	3 (4)

AS, aortic stenosis; ASHD, atherosclerotic heart disease; AVR, aortic valve replacement; CABG, coronary artery bypass graft; DM, diabetes mellitus; MR, mitral valve regurgitation; MS, mitral stenosis; MVR, mitral valve replacement; TR, tricuspid regurgitation; TVR, tricuspid valve replacement.

*AS-MR, AS, ASHD-AS, ASHD-MR-TR, ASHD-MR, ASHD-MS.

†AVR-MVR, CABG-AVR, CABG-MVR-TVR.

‡DM, hypertension, chronic bronchitis.

the deep breathing and coughing exercise of the interference subscale of the BPI-SF was 7.49 ± 2.31 (Table 3).

Table 2. Patient Experiences With Postoperative Pain and Pain Management (N = 70)

Postoperative Pain Experiences	n (%)
Types of pain	
Stinging/throbbing	29 (41)
Achy	41 (59)
Factors that increase pain after surgery*	
Coughing	49 (70)
Moving/walking	21 (30)
Physical exercise	7 (10)
Deep breathing	15 (21)
Postoperative pain relief factors*	
Analgesia	63 (90)
Sleeping/rest	32 (46)
Location of pain	
Sternum	66 (94)
Mediastinal drain location	10 (14)
Thorax drain location	8 (11)
Right saphena vein incision location	7 (10)
Left saphena vein incision location	5 (7)
Genital area	5 (7)
Time to medication for pain	
< 10 min	28 (40)
11-20 min	16 (23)
21-30 min	19 (27)
>60 min	6 (9)
I did not ask for medication	1 (1)
Satisfaction with pain management	
Between 8 and 10	29 (41)
Between 5 and 7	39 (56)
< 4	2 (3)
Pain management	
Acetaminophen	51 (73)
NSAID	4 (6)
Acetaminophen + NSAID	4 (6)
Others†	4 (6)

NSAID, nonsteroidal anti-inflammatory drug.

*More than one response.

†Tramadol, hyoscine-N-butilbromür, petidin hcl.

Comparison of patient characteristics with the pain severity and interference subscales of the BPI-SF shows a statistically significant difference between gender; the worst, least, and average pain scores in the last 24 hours; and the pain interference score during deep breathing and coughing ($P < .05$). A statistically significant difference was found between pain severity in the last 24 hours and sleep interference for patients who consumed alcohol, walking ability interference for patients with prior surgical experience, interference in relations with other people for patients with chronic

Table 3. Patient Pain Severity and Pain Interference With Activity (N = 70)

Pain Severity (0-10)	Mean ± SD	Median	Min	Max
Pain worst	7.50 ± 2.15	7	3	10
Pain least	2.04 ± 1.21	2	0	5
Pain on average	4.66 ± 1.68	5	1	8
Pain now	2.61 ± 1.88	3	0	7
Pain interference (0-10)				
General activity	7.30 ± 2.29	8	0	10
Mood	4.16 ± 4.07	3	0	10
Walking ability	6.67 ± 2.87	7	0	10
Deep breathing and coughing exercises	7.49 ± 2.31	8	0	10
Relations with other people	1.54 ± 2.72	0	0	10
Sleep	5.37 ± 4.30	6	0	10
Enjoyment of life	3.04 ± 3.22	2	0	10

disease, and sleep interference with patients' perceived health status ($P < .05$) (Table 4).

The study also found a weak, negative, and statistically significant correlation between pain management satisfaction scores of the patients and their scores obtained from the enjoyment of life item of the pain interference subscale of the BPI-SF ($P < .05$; $r = -0.26$). The finding indicates that the enjoyment of life interference score decreases as the score obtained from pain management satisfaction increases.

Finally, a moderate, positive, and statistically significant correlation was found between pain intensity scores of the patients in the last 24 hours and the scores obtained from the pain interference items of general activity, mood, walking ability, deep breathing and coughing exercises, sleep, and enjoyment of life ($P < .05$) (Table 5).

Discussion

The present study analyzed the postoperative pain severity, pain characteristics, and factors that affect pain for patients who underwent open cardiac surgery. More than half of the patients expressed their pain as achy (Table 2). Eti Aslan et al[16] found that most of the patients with cardiac surgery described their pain as aching. In another study, patients described their pain as stabbing and throbbing when they moved or when the chest tube was removed.[27] As pain is a subjective phenomenon, patients may have used different terms to describe their pain.

Defining the factors that impact pain is important for the evaluation of pain. This study found that the factors that increased pain were coughing and movement or walking. On the other hand, the participants of this study expressed that analgesics, rest, and sleeping decreased postoperative pain (Table 2). Similar to our findings, participants in the study of Çevik and Zaybak[23] mostly complained about pain when they coughed. Milgrom et al[13] analyzed levels for five activities expected of cardiac surgery patients (n = 705) and found that patients had worst pain when they coughed. Mello et al[9] also found that patients with open cardiac surgery (n = 48) had most pain when coughing and pain diminished over time. The pain of patients with open cardiac surgery after deep breathing and coughing is an expected situation related to the movement of intercostal muscles.

Most of the participants in the present study expressed that analgesics decreased their pain. Although nearly half of the participants stated that duration of pain treatment was less than 10 minutes, the pain management satisfaction levels expressed by the patients were at moderate levels (Table 2). Despite pain management methods other than opioids were used in the clinic, the administration of analgesics in less than 10 minutes may explain the moderate level of pain management satisfaction. This finding implies the importance of effective and timely pain management. Finally, the patients indicated the sternum incision area as the most severe area of pain (Table 2). Sternal incision pain occurs because of tissular damage

Table 4. Distribution of Mean Pain Scores and Pain Interference by Patient Characteristics (N = 70)

	Pain Severity (0-10)				Pain Interference (0-10)						
	Pain Worst	Pain Least	Pain on Average	Pain Now	General Activity	Mood	Walking Ability	Deep Breathing and Coughing Exercises	Relations With Other People	Sleep	Enjoyment of Life
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Gender											
Female	8.42 ± 1.84	2.63 ± 1.16	5.47 ± 1.31	3.21 ± 1.51	7.84 ± 1.98	5.26 ± 3.98	7.21 ± 3.10	8.37 ± 1.50	2.00 ± 3.40	6.21 ± 3.87	3.89 ± 3.45
Male	7.16 ± 2.18	1.82 ± 1.16	4.35 ± 1.71	2.39 ± 1.97	7.10 ± 2.39	3.75 ± 4.06	6.47 ± 2.78	7.16 ± 2.48	1.37 ± 2.43	5.06 ± 4.44	2.73 ± 3.11
t	2.25	2.59	2.59	1.64	1.21	1.40	0.96	2.00	0.86	1.00	1.36
P	.03*	.01*	.01*	.11	.23	.17	.34	.05*	.39	.32	.18
Alcohol consumption											
Yes	7.35 ± 2.29	1.53 ± 1.18	4.29 ± 1.72	2.47 ± 2.03	7.00 ± 1.77	4.76 ± 4.07	6.24 ± 2.19	6.94 ± 2.63	2.12 ± 2.87	7.29 ± 4.03	2.88 ± 2.96
No	7.55 ± 2.13	2.21 ± 1.18	4.77 ± 1.66	2.66 ± 1.85	7.40 ± 2.44	3.96 ± 4.09	6.81 ± 3.06	7.66 ± 2.19	1.36 ± 2.67	4.75 ± 4.23	3.09 ± 3.33
t	−0.32	−2.06	−1.03	−0.36	−0.62	0.71	−0.72	−1.12	1.00	2.18	−0.23
P	.75	.04*	.31	.72	.54	.48	.48	.27	.32	.03*	.82
Prior surgical experience											
Yes	7.45 ± 2.08	2.03 ± 1.16	4.64 ± 1.71	2.82 ± 1.74	7.27 ± 1.84	4.45 ± 4.17	5.94 ± 3.02	7.27 ± 2.05	1.45 ± 2.43	5.39 ± 4.14	3.27 ± 3.25
No	7.54 ± 2.24	2.05 ± 1.27	4.68 ± 1.67	2.43 ± 2.01	7.32 ± 2.66	3.89 ± 4.01	7.32 ± 2.59	7.68 ± 2.53	1.62 ± 2.98	5.35 ± 4.49	2.84 ± 3.23
t	−0.17	−0.08	−0.10	0.85	−0.09	0.57	−2.06	−0.73	−0.26	0.04	0.56
P	.87	.94	.92	.40	.93	.57	.04*	.47	.80	.97	.58
Chronic disease											
Yes	7.30 ± 2.27	1.73 ± 1.15	4.48 ± 1.79	2.55 ± 1.80	7.06 ± 2.51	3.82 ± 4.10	6.61 ± 3.02	7.12 ± 2.50	0.82 ± 2.02	5.15 ± 4.46	2.48 ± 3.03
No	7.68 ± 2.06	2.32 ± 1.20	4.81 ± 1.58	2.68 ± 1.97	7.51 ± 2.09	4.46 ± 4.07	6.73 ± 2.77	7.81 ± 2.11	2.19 ± 3.10	5.57 ± 4.20	3.54 ± 3.35
t	−0.72	−2.11	−0.81	−0.29	−0.82	−0.66	−0.18	−1.25	−2.16	−0.40	−1.38
P	.47	.04*	.42	.78	.41	.51	.86	.21	.03*	.69	.17
General health status											
Good	7.03 ± 2.04	2.00 ± 1.10	4.45 ± 1.72	2.10 ± 1.65	6.90 ± 2.78	3.21 ± 4.03	6.14 ± 3.15	7.21 ± 2.64	1.55 ± 2.63	4.17 ± 4.21	2.45 ± 3.10
Mod/Poor	7.83 ± 2.19	2.07 ± 1.29	4.80 ± 1.65	2.98 ± 1.97	7.59 ± 1.86	4.83 ± 4.01	7.05 ± 2.63	7.68 ± 2.05	1.54 ± 2.81	6.22 ± 4.20	3.46 ± 3.28
t	−1.54	−0.25	−0.88	−1.95	−1.24	−1.67	−1.32	−0.85	0.02	−2.01	−1.30
P	.13	.81	.38	.06	.22	.10	.19	.40	.98	.05*	.20

*$P < .05$.

Table 5. Correlations Between Pain Severity and Pain Interference (N = 70)

	Pain Worst	Pain Least	Pain on Average	Pain Now
General activity				
r	0.36	0.43	0.39	0.49
P	.00*	.00*	.00*	.00*
Mood				
r	0.38	0.30	0.38	0.39
P	.00*	.01*	.00*	.00*
Walking ability				
r	0.32	0.34	0.35	0.35
P	.01*	.00*	.00*	.00*
Deep breathing and coughing exercises				
r	0.41	0.42	0.45	0.41
P	.00*	.00*	.00*	.00*
Relations with other people				
r	0.14	0.17	0.11	−0.09
P	.26	.15	.34	.44
Sleep				
r	0.44	0.19	0.38	0.26
P	.00*	.11	.00*	.03*
Enjoyment of life				
r	0.33	0.31	0.34	0.17
P	.01*	.01*	.00*	.16

*$P < .05$ (the Pearson correlation analysis was used).

in the skin, subcutaneous tissue, bone, and cartilage.[15] It is the most common complaint of patients after cardiac surgery and can inhibit normal respiration, deep breathing, and effective coughing and may cause respiratory dysfunction.[16,22,28] Sternal incision pain may limit patient activities. Therefore, nurses should assess postoperative pain locations and educate patients about the negative consequences of limiting their activities.

The analysis of pain severity and the factors influencing pain shows that patients report the pain in the last 24 hours as the worst, whereas the average least pain severity scores were weak. The average pain severity scores of the participants were at the moderate level, and pain severity during the interviews was weak (Table 3). Existing studies found that patients with open cardiac surgery had moderate to severe pain.[28,29] Watt-Watson et al[11] found that 69% to 80% of 406 participants had severe to extreme pain. Furthermore, Hamid et al[30] investigated pain management quality of 308 cardiac surgery patients in the intensive care unit and found that 70% of the participants had moderate and 28% of the patients had severe pain. Coşgun[21] studied 80 patients and found that 43.8% had severe and 53.8% had extreme pain. Comparison of findings in the literature with our findings shows that patients who underwent open cardiac surgery had moderate to severe pain and that the findings of this study are in agreement with the literature in general.

The perception of pain may differ from person to person. Analysis of the factors affecting perceived pain has an important role in describing pain, identifying the reasons for the pain, and managing the pain. Gender and cultural characteristics are among the factors that influence pain. According to existing studies, male and female participants do not differ in terms of their reactions to pain and gender-related differences are closely related with cultural characteristics of the participants.[31] The analysis of the relationship between gender of the participants of this study and the expressed pain severity shows that female participants scored higher in terms of the least, the worst, and the average pain severity scores in the last 24 hours, compared with the male participants. In addition,

the difference between the female and male participants was statistically significant (Table 4). Existing studies found that pain severity of the female patients with open cardiac surgery was higher than that of the male participants.[14,32,33]

Patients with chronic diseases ranked lower in terms of the least pain severity in the last 24 hours. However, pain threshold for patients with chronic diseases is higher than those of patients without chronic diseases (Table 4). Besides, interference with relations with other people is higher for patients without chronic diseases ($P < .05$; Table 4). Patients with chronic disease developed methods to cope with such diseases over time. Moreover, interpersonal relations of the patients with chronic diseases may have been affected less than those of the other people.

The findings of this study suggest that patients with prior surgical experience have walking ability restrictions because of their pain experience (Table 4). Pain of patients without prior surgical experience should be evaluated before activities such as walking. In case of pain, walking exercises should be planned after pain is controlled, and the patients should be informed about their experience. In addition, effective pain management according to pain severity is necessary when the patients are engaging in such activities.

In this study, the patients who perceive their health status at moderate and worsening levels had sleep interference because of pain, compared with the patients who perceived their health at better levels (Table 4). This situation may be related to the effects of pain and fear of death on sleep for the participants who rank their health status at medium to worsening levels. Therefore, the anxiety and fears of patients after open cardiac surgery should be evaluated. Such attempts and plans may positively influence pain management.

The study also found that the enjoyment of life interference score decreased as the score obtained from pain management satisfaction increased. This finding is an expected finding, which implies that effective pain management will improve enjoyment of life.

Finally, the worst, least, and average pain scores in the last 24 hours and the pain score during the interview affected pain interference on general activity, mood, walking ability, deep breathing and coughing exercises, sleep, and enjoyment of life (Table 5). All degrees of pain severity posed a barrier that hindered patient activities. This finding implies that pain management was poorly performed. This situation may stem from the use of nonsteroidal anti-inflammatory medicines and inefficient use of multimodal analgesia, opioids, and nonpharmacologic methods in patient treatment. Studies on the effect of multimodal analgesia on postoperative pain treatment suggest that the use of different analgesic medicines together with different nonpharmacologic methods result in fewer side effects and better postoperative rehabilitation.[34]

Limitations of the Study

This study has some limitations. The study sample comprised a small number of patients from only a single state hospital and was nonrandom; therefore, the findings are not generalizable to all patients who undergo open cardiac surgery.

Conclusions

To the best of our knowledge, there are no studies on pain characteristics, factors affecting pain, and effects of pain on activities after open cardiac surgery in the TRNC. Therefore, in this study, in addition to pain severity and pain characteristics, we obtained new findings regarding the interference of pain.

The findings of this study suggest that patients who underwent open cardiac surgery experienced severe pain and that the analysis of pain severity on its own is not sufficient for these patients. Patient expressed their pain as achy, and analgesics, rest, and sleep decreased postoperative pain. Activities such as walking, deep breathing and coughing exercises, and sleep are important factors for postoperative recovery. Postoperative pain severity is an important barrier for such activities. This study found that all degrees of pain severity experienced by the patients restricted patient activities.

Future Directions

Nurses should assess postoperative pain that interferes with activities and educate patients about the negative consequences of limiting their activities. For this purpose, the team of nurses, anesthetists, and cardiovascular surgeons, who prepare clinical

protocols, may use multimodal treatment methods and administer analgesics on time before these activities. Such a study may be helpful to determine pain characteristics, control pain and contribute to pain management, and develop effective nursing interventions. Longitudinal studies are required to determine the duration of pain and effects of pain interferences after open cardiac surgery.

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