Original Article

The Effect of Family-Oriented Educational Intervention on Postoperative Pain after Orthopedic Surgery

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Abstract

Background: Non-pharmacological methods including the improvement of knowledge of patients and his/her family members in the management and control of pain can reduce patients' experiences of pain. The present study aimed to investigate the effects of family-oriented educational intervention on postoperative pain after orthopedic surgery. **Materials and Methods:** This study is a non-randomized controlled trial with the control group, which was carried out on 46 patients in orthopedic surgery units of Mousavi Hospital in Zanjan in 2017. Patients were selected based on convenience sampling and categorized into two groups of experimental (n = 23) and control (n = 23) groups. In the experimental group, educational intervention was performed with the attendance of the patient and his/her family members in two sessions of the preoperative and postoperative period. The control group received routine care. The pain intensity was measured by Visual Analog Scale (VAS) for 3 days in both control and experimental group. Data were analyzed by using Chi-square, Fisher exact test, independent t-test, and Analysis Of Variance (ANOVA) with repeated measures and Greenhouse–Geisser. **Results:** Mean (SD) of pain intensity in the experimental and control groups was 5.21 (1.47) vs 6.74 (1.30) on the first day, 2.91 (1.20) vs 4.81 (1.32) on the second day, and 1.75 (0.67) vs 3.38 (1.53) on the third day, respectively. Pain severity reduction was significant in the experimental group compared to control group in every 3 days after surgery (F = 152.30, df = 1.62, p = 0.005). **Conclusions:** Family-oriented educational intervention resulted in reducing the intensity of pain and the use of narcotic drugs after orthopedic surgery.

Keywords: *Family, Iran, orthopedic surgery, pain, patient education*

Introduction

Pain relief after orthopedic surgery is effective in the early ambulating, facilitating recovery, initiating physiotherapy, and reducing hospital stay and is necessary to return the patients' functions after surgery and reduce the risk of postoperative complications.[1] Despite the use of medication to relieve postoperative pain, studies show that patient's satisfaction from acute postoperative pain management is not desirable.[2,3] American studies showed that 80% of the patients undergoing surgery experience acute postoperative pain so that the experienced pain in 20% of patients are very severe.[4] The study by Tavakoli *et al.* (2005) about patients 'satisfaction after orthopedic and abdominal surgery showed that 70.6% of patients were completely dissatisfied with postoperative pain relief during the first 24 hours and 29.45% of them had moderate to poor satisfaction.[5]

Available evidence suggests that the use of pharmacological interventions such as opioid analgesics are accompanied by complications such as constipation, lethargy, nausea and vomiting, drowsiness, poisoning, respiratory depression, and patients' dependence on these drugs.[3,6] Today, there is a strong emphasis on postoperative pain control by using non-pharmacological methods. One of the non-pharmacological methods that have been taken into consideration in recent years is improving patient and family's knowledge of pain control.[7,8] It is believed that, in addition to the patient, family members should also be involved in the management and control of the pain.[9] Family-based care as a care philosophy recognizes the importance of the family unit as the focal point of all health care. This kind of care is provided through mutually beneficial partnerships between caregivers and family

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Access this article online

Website: www.ijnmrjournal.net

DOI: 10.4103/ijnmr.IJNMR_127_18

Quick Response Code:

How to cite this article: Rahmani M, Bahraminejad N, Rezaei M. The effect of family-oriented educational intervention on postoperative pain after orthopedic surgery. Iranian J Nursing Midwifery Res 2020;25:47-52.

Received: 06 September, 2018. **Revised:** 21 September, 2019. **Accepted:** 04 November 2019. **Published:** 27 December, 2019.

members.[10] It seems that family-centered involvement is effective in controlling the pain. The study by Grundin *et al*. (2014) regarding the effect of family-based educational intervention on postoperative pain relief and improvement of the use of non-pharmacological methods in patients undergoing hip replacement surgery showed that family-centered educational intervention led to the reduction of postoperative pain on the 2nd and 4th days after surgery. Despite the effectiveness of this intervention, there are still insufficient studies on the effect of family-based educational intervention on acute pain, and further studies on the effect of this type of involvement on acute pain are recommended in different hospitalization.[11]

In addition, due to the influence of the cultural factor on pain perception, the results of limited studies conducted on family-centered intervention on pain management cannot be generalized to other communities. Health care workers must be aware that families interfere with their cultural background in managing pain.[12] Therefore, due to the lack of sufficient evidence regarding the effect of family-based intervention on acute pain in Iran, the current study aimed to investigate the effect of family and patient educational intervention on postoperative pain in patients undergoing orthopedic surgery through non-randomized controlled trial study.

Materials and Methods

This is a non-randomized controlled trial with the control group (IRCT2016102816843N3) which was conducted in 2016. The study was carried out on 46 patients undergoing orthopedic surgery referring to Ayatollah Mousavi Hospital in Zanjan. The study was conducted within 4 months in 2017 (from 22 May to 1 September). The participants were selected through convenience sampling. Since there is only one orthopedic ward in the Mousavi Hospital, in order to prevent the exchange of information between family members of the experimental and control group, the study was conducted in two stages. In the first stage, the experimental group received the educational intervention after completing the sampling of the experimental group and in the second stage the control group's data were collected. The control group received routine care. It should be noted that in both groups, one of the family members who were accompanied by the patient during 2–3 days after the surgery was also included in the study. Family members included spouse, brother, sister, child, and parents in the study. Inclusion criteria in the study included consent for participation in the research, candidacy for upper or lower extremities orthopedic surgeries, having alertness and cooperation, age over 18, nonuse of psychotropic drugs, lack of history of addiction and mental illness, literacy of reading and writing, fluency in Farsi, vision to see and understanding Visual Analogue Scale (VAS), having no history of previous surgery, and having a literate companion during the hospital stay. Also, inclusion criteria for a family member included reading and writing skills in Farsi, attending a pain management training session, and a willingness to participate in the study. Exclusion criteria for patient and family member also included the lack of collaboration of the family and the patient during the intervention, decreased consciousness, early discharge or death of the patient during the intervention, the use of specific pharmacological methods to reduce pain by the patient (drug use), and the need for special interventions after surgery, including oxygen therapy.

The sample size according to the study by Grondin *et al*.[11] with assuming a standard deviation of 2.50%, $\alpha = 5\%$, and $\beta = 10\%$, with a confidence interval of 95% and a power of 90%, and based on the following formula was estimated to have 23 patients in the experimental group and 23 patients in control group. The control group comprised 23 individuals receiving routine care, and the experimental group comprised 23 individuals receiving educational intervention.

The educational content was devised by the research team. To provide the content of educational interventions, first, through a pilot study, the educational needs of patients and their families in relation to postsurgical pain management and non-pharmacological treatments were reviewed and then a booklet was prepared. The booklet comprised simple explanations of the physiology of postsurgical pain, drug treatments and their complications, and non-pharmacological treatments including encouraging the patient to express fear and concern, introducing relaxation methods (focused on breathing techniques, distraction through watching TV, reading books, talking, and using music). The content of this training booklet was utilized to educate the intervention group. The intervention was conducted in two sessions. The first one was carried out on the day before the surgery for 30 minutes at the bedside by the researcher (with the presence of the patient and his/her family members). The first session of intervention was concentrated on educating patients and families regarding the content of the provided booklet. After the patient had been alert, the second session of intervention was performed which included assessing of how to use the pain measurement tool before requesting sedatives, recorrecting unrealistic expectations of postsurgical pain, reviewing, reinforcing, and encouraging non-pharmacological pain relief used by patient and family, and emphasizing the patient and the family that the patient receives standard treatment for pain control. It should be noted that the control group received routine care. Similar to experimental group, control group received the same instructions to complete VAS tool.

The tools used to collect data included four parts of the patient and his/her family members' demographic information (such as age, sex, marital status), beliefs and knowledge of the patient and the family about pain, VAS tool, and Spielberger questionnaire. In order to evaluate the

intervention, the pain intensity of the patient was measured using a VAS during the waking hours of the patient every 4 hour for 72 hours by research assistant. The first pain measured 4 hours after surgery. After surgery, in addition to the intensity of pain, the types of non-pharmacological methods used in the experimental group were recorded by the researcher's assistant. If there was a need for sedatives, patients would receive routine doses in both experimental and control groups. In both groups, the type of the taken sedative was also extracted from the patients' files and recorded by the help of a research assistant. Pain measurement in the control group was similar to that of the experimental group. Initial data collection including demographic information and patients' viewpoints on postoperative pain were done in both experimental and control groups by the researcher. In order to remove the measurement bias, pain assessment after the intervention was carried out in the experimental and control groups by the patient (according to the table for pain recording) or by a research assistant.

The face validity of patient and family viewpoint on pain and the provided educational booklet were assessed by 10 members of the board of faculty of Zanjan University of Medical Sciences and nurses of the surgical wards. VAS is a measure of pain intensity and comprised a horizontal or vertical line, usually 10 cm (100 mm) in length.[13] Studies in Iran and outside Iran confirmed the validity and reliability of VAS tool.[14,15] In addition, the validity and reliability of the Spielberger's questionnaire have also been measured in previous studies in Iran and other countries.[16,17] Marteau and Bekker (1992) reported correlation coefficients greater than 0.90 using four and six items from the State-Trait Anxiety Inventory.[16] In the study conducted by Panahi in Iran, criterion validity and internal consistency of the tool (using Cronbach's alpha) were determined and Cronbach's alpha = 0.94 was reported.[17] In order to study the demographic and background variables in the two groups, analytical statistical tests including Chi-square, Fisher exact test, and independent *t*-test were used. In order to determine the effectiveness of intervention in the experimental and control groups after deciding the normal variables, Kolmogorov Smirnov test, and independent *t*-test, ANOVA with repeated measures and Greenhouse–Geisser were used. Data analysis was done by using IBM SPSS Statistics for Windows (version 16, IBM Corporation, Armonk, NY, USA). In this study, *p* value less than 0.05 was considered significant.

Ethical considerations

This study had begun after it was approved by the Ethics Committee (with Ethics Code ZUMS.REC.1394.3.17) of Zanjan University of Medical Sciences. Written informed consent was obtained from participants before the study.

Results

A total of 46 patients undergoing orthopedic surgery (upper or lower extremities) participated in this study. There was no significant difference between the two groups in terms of demographic characteristics and underlying variables [Table 1].

The results of the data analysis indicated that there was a significant difference in postoperative pain severity on the 1st, 2nd, and 3rd days between experimental and control groups. This means that mean (SD) of pain intensity experienced in the experimental group in comparison with the control group were 5.21 (1.47) versus 6.74 (1.30) on the first day, 2.91 (1.20) versus 1.81 (4.81) on the second day, and 1.75 (0.67) versus 3.38 (1.53) on the third day was less. According to the results of repeated measures and with regard to the insignificant interaction between group and time by Greenhouse–Geisser method, the mean of pain during 3 days was statistically significant ($F = 152.30$, $df = 1.62$, $p = 0.005$) [Table 2].

Although there was no significant difference between the two groups in terms of the surgical site, there was a significant difference between the two groups in terms of taking sedatives. The consumption of apotel, pethidine, and diclofenac suppository in the control group were higher than the experimental group on the first day ($\chi^2 = 12.39$, $p = 0.01$) and second day ($\chi^2 = 9.32$, $p = 0.01$) after surgery. However, the oral consumption of acetaminophen (tablets 500 mg) in the experimental group was higher than that of the control group [Table 3].

Discussion

The results showed that the use of family-based educational intervention resulted in a significant reduction in the severity of postoperative pain in the experimental group compared with the control group. Comparison of pain intensity changes on the 1st, 2nd, and 3rd days of surgery in the control and experimental group showed that pain intensity was lower in the experimental group than in the control group every 3 days after surgery and this decrease in pain intensity was statistically significant. The results of this study are consistent with the study of Grundel *et al*. (2014) regarding the effect of family-based educational intervention on pain relief after surgery and improving the use of non-pharmacological methods in patients undergoing hip replacement surgery. His study showed that family-based educational intervention reduced postoperative pain on the 2nd and 4th day after surgery.[11] A study by DiGioia *et al*. (2007) also showed that family-based intervention reduced postoperative pain in patients undergoing hip surgery. Accordingly, DiGioia *et al*. (2007) recommend the implementation of a patient and family-based care approach and believed that patient and family education about postoperative pain management be a noninvasive and multipurpose approach and can be included in postoperative nursing care program.[18]

Table 1: Comparison of demographic and underlying variables in experimental and control groups

Variable	Experimental (*n*=23) Mean (SD)	Control (*n*=23) Mean (SD)	Statistical test	df	*p*
Age	38 (12.39)	37.87 (13.11)	t=0.12		0.09
State Anxiety	49.17 (14.78)	48.565 (7.89)	t=0.61		0.54
Sex					
Male	19 (82.60%)	19 (82.60%)	χ^2=0	1	0.65
Female	4 (17.40%)	4 (17.40%)			
Marital status					
Single	7 (30.44%)	9 (39.14%)	χ^2=1.50	1	0.19
Married	16 (69.56%)	14 (60.86%)			
Employment status					
Employed	11 (47.83%)	13 (56.53%)	χ^2=0.34	1	0.68
Unemployed	12 (52.17%)	10 (43.47%)			
Educational level					
Elementary	11 (47.80%)	5 (21.73%)	χ^2=4.16	2	0.63
Guided school	6 (26.10%)	6 (26.10%)			
Diploma and above	6 (26.10%)	12 (52.17%)			
Habitat					
Urban	18 (78.26%)	22 (95.65%)	Fisher's exact test=1.50	1	0.70
Rural	5 (21.74%)	1 (4.35%)			
Surgical site					
Upper limb	7 (30.44%)	3 (13.04%)	Fisher's exact test=1.02	1	0.15
Lower limb	16 (69.56%)	20 (86.96%)			
Type of anesthesia					
General	9 (39.13%)	6 (26.09%)	χ^2=1.24	1	0.34

Table 2: The mean and standard deviation of pain scores in experimental and control groups in terms of time measurement

Days	Mean (SD)		Time-group interaction			Effects of groups over time		
	Experimental	Control	*F*	df	*p*	*F*	df	*p*
The first day after surgery	5.22 (1.48)	6.75 (1.30)	0.46	2	0.439	152.30	1.62	0.005
The second day after surgery	2.92 (1.20)	4.81 (1.32)						
The third day after surgery	1.76 (0.67)	3.39 (1.53)						

Table 3: Distribution of absolute and relative frequency of type of sedative used during 3 days after surgery in the two groups of experimental and control

Day after surgery	Analgesic	Experimental	Control	df	χ^2	*p*
First day	Apotel (IV)	6 (26.10%)	14 (60.90%)	3	12.39	0.01
	Acetaminophen (PO)	17 (73.90%)	4 (17.40%)			
	Pethidine (IM)	11 (47.80%)	21 (91.30%)			
	Diclofenac (SUPP)	3 (13%)	9 (39.10%)			
Second day	Apotel (IV)	1 (4.30%)	11 (47.80%)	3	9.32	0.01
	Acetaminophen (PO)	16 (69.60%)	8 (34.80%)			
	Pethidine (IM)	6 (26.10%)	15 (65.20%)			
	Diclofenac (SUPP)	8 (34.80%)	14 (60.90%)			
Third day	Apotel (IV)	2 (8.70%)	8 (34.80%)	3	6.50	0.01
	Acetaminophen (PO)	8 (34.80%)	8 (34.80%)			
	Pethidine (IM)	0	9 (39.10%)			
	Diclofenac (SUPP)	0	1 (4.30%)			

This study supports the result of previous studies that in addition to the patient, his/her family members also play a role in the management and control of pain.[19,20] Providing family support to care for patients undergoing pain is necessary.[21] The family-based educational intervention through changes in cognition, optimism, elimination of false beliefs, empathy, and decision-making power can increase hope and purposeful thinking in families and patients and thereby helps to improve mental health and postoperative pain.[20] Moreover, Epstein and Street point

out that involving patients and families through improved communication also has a positive effect on patient's outcomes specifically on emotional health and pain control.[22] Very limited studies have been done on the effect of family and patient's education on postoperative pain control. Most studies have been done on cancer pain. In line with the results of this study, a study by Tse *et al*. (2012) on the effect of a pain management educational intervention program on patients with cancer pain showed that after the intervention, patients in the experimental group had a significant reduction in pain control scores compared to the control group. Better compliance with non-pharmacological strategies for pain control was reported in the experimental group as well.[21] The results of the studies indicate that family members and caregivers need training in pain management and recognition from care providers about their role in pain management.[23]

The results of this study as to taking analgesics within 3 days after surgery showed that there is a significant difference between taking analgesics type in 3 days after surgery in the two groups of control and experimental so that taking opioid analgesics in the control group was higher than that of the experimental group on every 3 days. The present finding confirms O'Donnell's study on improving the use of non-pharmacological methods and reporting medication side effects following educational intervention in patients hospitalized in outpatient general surgery service.[24]

The present study was a non-randomized controlled trial with the control group. However, due to the non-random allocation of samples, it is not possible to generalize the results to other surgical procedures. In this study, patients undergoing orthopedic surgery in both upper and lower extremities were included. The intensity of postoperative pain may vary in different limbs. However, the present limitation was largely controlled by equalizing the surgical site in both experimental and control groups.

Conclusion

The results of this study indicate that training and involving the patient and family in pain management by confirming family member in order to provide support for the patient, the improvement of their ability to understand the nature of postoperative pain, and involving them to evaluate pain intensity and to apply non-pharmacological pain control methods cause the patients to take less opioid analgesics to reduce pain intensity as well as better pain control.

Acknowledgements

This article was extracted from a research project approved by Zanjan University of Medical Sciences with the code number of A-11-149-4. Thereby, the authors appreciate the vice-president of research at Zanjan University of Medical Sciences.

Financial support and sponsorship

Zanjan University of Medical Sciences

Conflicts of interest

Nothing to declare.

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