

Preoperative Education for Pain Relief after the Lower Limb Joint Replacement Surgery: A Systematic Review and Meta-Analysis

Mohammadreza Moharrami¹, Hasan Mohammadipour Anvari², Leili Abedi Gheshlaghi³, Behrooz Nazari^{1*}

¹ Department of Orthopedics, Medicine Faculty, Tabriz University of Medical Sciences, Tabriz, Iran

² Associated Professor of Anesthesia, Paramedical Faculty, Tabriz University of Medical Sciences, Tabriz, Iran

³ Ph.D Student of Epidemiology, Department of Statistics and Epidemiology, Faculty of Health, Kerman University of Medical Sciences, Kerman, Iran

* **Corresponding Author:** Behrooz Nazari, Department of Orthopedics, Medicine Faculty, Tabriz University of Medical Sciences, Tabriz, Iran. Email: nazari_b@yahoo.com

Received June 8, 2020; Accepted August 28, 2020; Online Published February 01, 2021

Abstract

Background: Knee and hip replacement surgeries are associated with chronic postoperative pain, and since their management is a clinical challenge to nurses.

Objectives: the present meta-analysis aimed at investigating preoperative education for pain relief after the lower limb joint replacement surgery.

Methods: Quasi-experimental studies and clinical trials of preoperative education for the management of pain after hip and knee replacement surgeries publishes in English were searched in the databases of Web of Science, Cochrane Library, CINAHL, PubMed, Embase, and Scopus.

Results: Out of 209 articles retrieved, five were eligible to enter the meta-analysis. Based on the obtained results, the difference in the mean scores of pain in days 1, 2, and 3 after surgery in the intervention groups was lower than that of the control groups; however, the relationship was statistically insignificant.

Conclusion: Evidence from study results suggests that pre-THA and TKA training may not significantly reduce pain; However further investigation is needed.

Keywords: Knee replacement, hip replacement, preoperative training, pain.

Introduction

Postoperative pain is a clinical challenge to nurses for taking care of patients.^{1,2} It is common occurred as an acute condition due to tissue damage, inflammation, and healing process.^{3,4} Most patients compliant with postoperative pain, but the level of pain varies across surgeries and depends on patient's experiences, age, gender, and expectations.⁵ A combination of these factors makes it difficult to predict the level of pain experienced and its tolerance.^{4,6}

Inadequate assessment and management of postoperative pain may cause insomnia anxiety, increased need for analgesics, experience of pain, increased stress, and limited mobility.^{7,8} Various factors play a role in failure to control pain, including poor caregiver-patient relationship, unrealistic expectations, and improper education of patients.^{9,10} Poor control and inadequate treatment of pain may lead to negative consequences, such as progression of chronic pain, deep vein thrombosis, atelectasis, increased

postoperative complications, prolonged hospitalization, exacerbation of the disease, prolonged use of medicines, particularly narcotics, physical dysfunction and lower quality of life, impaired recovery, increased care costs, and delayed return to normal daily activities and work.^{11,12}

Unfortunately, narcotics administered to control postoperative pain have many side effects; for instance, morphine has a negative effect on the internal regulation of endorphins secretion and contributes to the natural body's response to pain.⁶ In addition, relieving postoperative pain without narcotics use reduces nausea, vomiting, and risk of wound dehiscence, and facilitates mobility.⁷ In addition, it seems that early postoperative pain may lead to persistent pain lasting months in a significant number of patients. Preventive measures should be performed to control the progression of acute and chronic postoperative pain, and reduce the incidence and intensity of pain during and immediately after surgery.^{8,9} Despite a better understanding

of pain mechanisms, reports of the prevalence of postoperative pain, advances in pain management techniques, and other initiatives aiming to improve pain control outcomes in the last decade, the management of postoperative pain remains a major health concern.

Pain management is one of the major clinical challenges of postoperative nursing care. However, previous studies have not shown adequate progression and management of postoperative pain^{10,11} Raising patients' awareness of pain and analgesic options may increase the likelihood of achieving the optimal control of postoperative pain. By shortening the duration of hospitalization and increasing the number of surgeries per day, patients should be comfortable enough to participate in the recovery process and continue self-care practices immediately in the postoperative period.

Preoperative education is a tool to prepare patients for planning the management of pain and the postoperative recovery period. The education can include information about the importance of pain management and treatment goals. The level of pain might be experienced by the patient, and the importance of reporting pain. Pain management options, including both pharmacological and non-pharmacological strategies, should be explained and available.¹²⁻¹⁴ Despite years of evidence-based education and guidance, researches showed that the management of postoperative pain remains a major problem. Evidence of the effect of preoperative education on postoperative pain varies contradictory. A review study conducted by McDonald et al., examining training in hip joint replacement reported contradictory results (Patient training). Various review studies have focused on specific surgeries, with a range of consequences. Until now, to the best of authors' knowledge, no comprehensive study investigated postoperative pain in various surgical and educational interventions.¹⁵ Therefore, it is essential to combine the evidence and systematic evaluation of the effect of preoperative educational interventions on postoperative pain in patients undergoing elective surgery and examine the contents and different types of preoperative educational interventions.

Objectives

Hence, the present study aimed at determining the effect of preoperative education on pain relief in the lower limb (knee/hip) joint replacement surgery.

Materials and Methods

Search strategy

The present systematic review study relied on the Cochrane Manual for Systematic Reviews for Interventional Studies,¹⁶ using the PRISMA statement (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). The search strategy was retrieved and prepared for related studies, using PICO search terms (i.e., patient or population, intervention, control, or comparison and results). The Cochrane Library, CINAHL, PubMed, Scopus, Web of Science, and Embase electronic databases were searched for the clinical trials research on the effect of preoperative education on pain relief after elective knee/hip replacement surgery, published by the end of 2019 in the English and Persian languages.

The combination of used search terms was: (Perioperative Period) (Mesh) and (Patient Education as Topic) (Mesh) and (Postoperative Period) (Mesh) and (Postoperative Pain) (Mesh), using logical functions (AND, OR, NOT). In addition, other references from original and related review articles were searched in the mentioned databases, and then reviewed. After screening of the titles and abstracts, duplicate articles were excluded. The full-texts of all remaining articles were reviewed for eligibility. Finally, the eligible articles on preoperative education of patients with hip/knee replacement surgery were included.

Inclusion criteria

Study types: Original research articles published by the end of 2019 in the English language. Articles on adult populations (aged 18 years and above) undergoing elective surgery, and randomized controlled, quasi-experimental, clinical trials of preoperative education in patients undergoing elective surgery. **Intervention types:** Articles on the effectiveness of preoperative education in the outcomes of postoperative pain.

Sample types: Articles on adults undergoing lower limb joint (hip/knee) replacement surgery. **Preliminary results:** Articles reporting the initial measurements of pain level.

Secondary outcomes: including anxiety, quality of life, surgical wound complications, and patient satisfaction. Gray literature on unpublished results in dissertations and articles published in journals with a low impact factor were not reviewed due to difficulty in accessing and lack of credibility.

Extraction and combination of data

The Cochrane data extraction form for systematic review was utilized in the current study. The two authors extracted

data from the selected articles separately and reached an agreement after exchanging the views. In this regard, if there was a disagreement between the two researchers, the third researcher would be asked to judge between them. The data extraction form the included items on the name of the first author, year of publication, authors' nationality, study design, intervention details (e.g. educational content, number and duration of sessions), research tools, evaluation, and results.

Qualitative evaluation

Qualitative evaluation of the clinical trials was performed by the Center for Review & Dissemination (CDR 2009). All the included articles were evaluated in terms of the following criteria: randomization, blinding, follow-up, analysis of excluded subjects, blinding of data analyzers, and delivering the same treatment, except intervention. CDR 2009 has seven items scored based on a 0-1 scale. If a study meets a criterion, it gets 1 point, otherwise gets 0. The total score of the scale ranges from 0 to 7; scores of ≥ 5 indicate a high quality of the evaluated article.

Statistical analysis

In the present study, the I^2 index and Cochran test were utilized to evaluate the heterogeneity of the studies (P-value < 0.1). Given the significance of the Cochran test results and heterogeneity of the studies the random-effects model was used to estimate the pooled mean difference. The Meta-command was used to estimate the difference between the mean pain scores of the intervention and control groups, as well as the difference between the mean pain scores of 1 and 3 post-surgical days in the intervention and control groups. The Egger and Begg tests were used to evaluate the publication bias. A Forest plot was used to display the results of each study, as well as overall estimates and confidence interval of 95%. Data analysis was performed using Stata 16 (Stata Corp, College Station, TX, USA).

Results

Selection of articles: All articles published in the English language were systematically reviewed based on four steps of PRISMA. A total of 209 studies were retrieved in the initial search. It should be noted that no article was found in the article review; also, no article was found in Persian. Then, 93 duplicates were excluded. After the evaluation of the titles and abstracts, 40 articles were excluded. Besides, 35 ineligible articles were excluded after the review of their full-text,

including qualitative studies, non-experimental and quasi-experimental studies without a control group, those without preoperative education, and papers reporting irrelevant outcomes. Finally, five articles entered the systematic review ([Figure-1](#)). A brief and complete description of the reviewed articles is presented in ([Table-1](#)).

Qualitative evaluation of the articles showed that three (60%) had a high quality (3-5) and the rest had a low quality (1-2) ([Table-2](#)). Of the five studies retrieved, two articles (40%) were quasi-experimental (1-2), and the rest randomized clinical trials (3-5). Patients were within the age range of 64-73 years.

Outcomes of the studies: The present study focused on the effect of preoperative education on postoperative pain in patients, and other findings were not discussed specifically and comparatively due to lack of homogeneity- e. g., anxiety, quality of life, surgical wound complications, and patient satisfaction ([Table-1](#)).

Methods of education: The content provided for the intervention group was presented in written, verbal, audio, and video forms in DVDs and CDs. The writing methods included manuals and educational pamphlets. In-person classes and face-to-face training were also used for training; the time of each session varied from 15 to 30 minutes. The results of the training were followed up 1-3 days after surgery. Nevertheless, some studies held a single session before surgery using a variety of educational content and even a combination of educational methods ([Table-1](#)).

Instruments utilized: Two standard scales were utilized to measure the level of pain, amongst them, the visual analogue scale (VAS) was the most commonly used one (1-4), while the numeric rate scale (NRS) was used only in one study (5).

Based on the results of the meta-analysis, the difference among the mean pain scores of days 1, 2, and 3 after surgery in the intervention group was lower than that of the control group; however, the relationship was not significant ([Figure-2](#)). According to [Figure-3](#), a comparison of pain scores of days 1 and 3 after surgery showed that preoperative education could affect postoperative pain levels, so that the difference in the mean pain score on day 1 was 1 point higher than that of day 3. Also, the difference in the mean pain score of day 1 after surgery was lower than that of day 3. Due to the small number of meta-analyses, the comparison of the pain scores on days 1 and 2 after surgery was not possible.

According to the Begg and Egger tests, there was no evidence of publication bias for the pain score of postoperative on days 1 ($P=0.37$), 2 ($P=0.45$), and 3 ($P=0.38$).

Discussion

Given that the importance of preoperative education is increasing, the results of the present systematic review showed that there was no evidence of the efficacy of preoperative education in postoperative pain relief. However, since the quality of the evidence varied, these results should be interpreted with caution. In addition, different outcomes should be further discussed in different aspects.

The differences in the results may be attributed to the effects of type of applied educational approach and power of education on postoperative outcomes by different studies. Some studies have even emphasized on self-care education.¹⁷ Many self-care education strategies in patient education programs are developed to fulfill their role in the management of disease and its symptoms. Self-efficacy is the belief in the application of personal abilities to organize and implement the necessary actions in the situations ahead. Self-efficacy is a factor that modulates postoperative pain, as well as its recovery and anxiety.^{18,19}

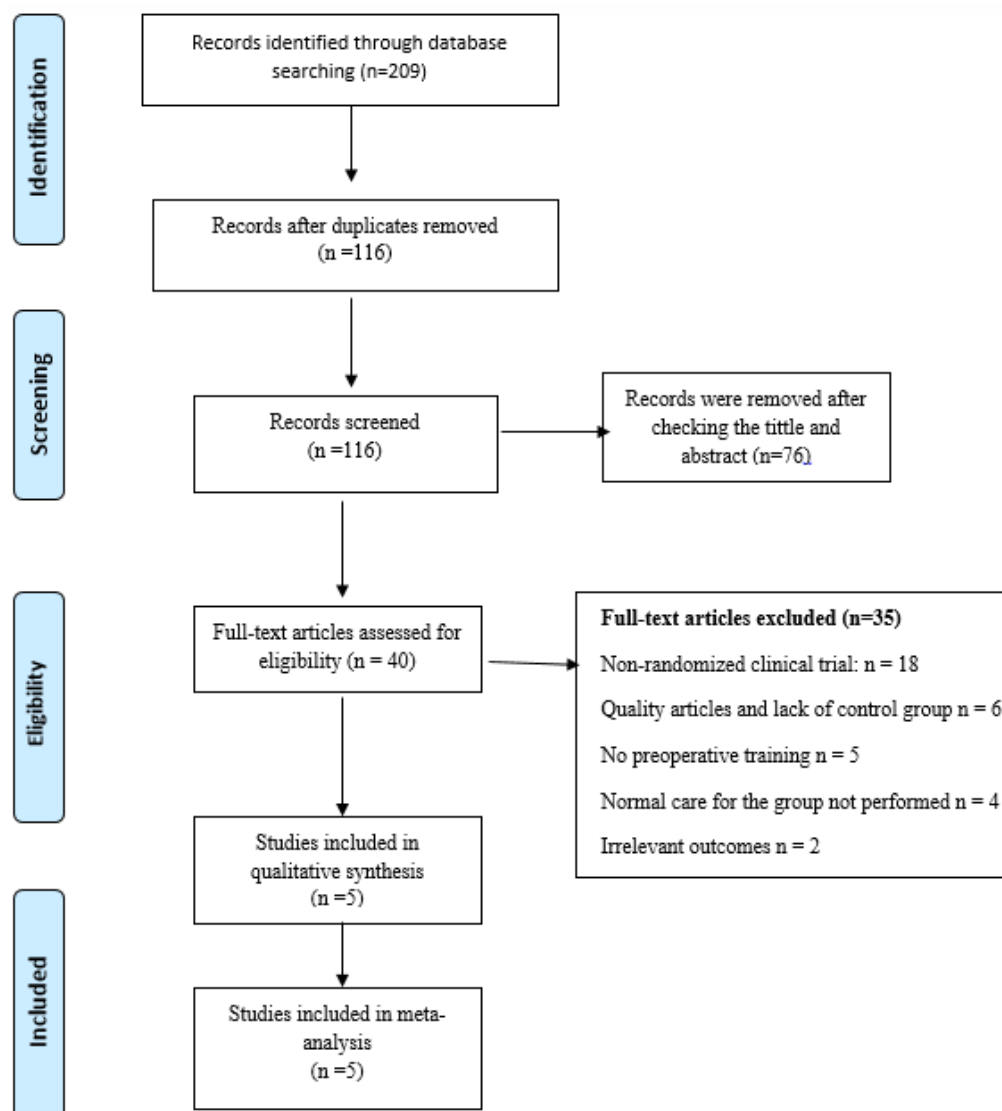


Figure-1. Article search strategy diagram for systematic review and meta-analysis of effect of preoperative training on pain after lower extremity joint replacement surgery (pelvis and knee)

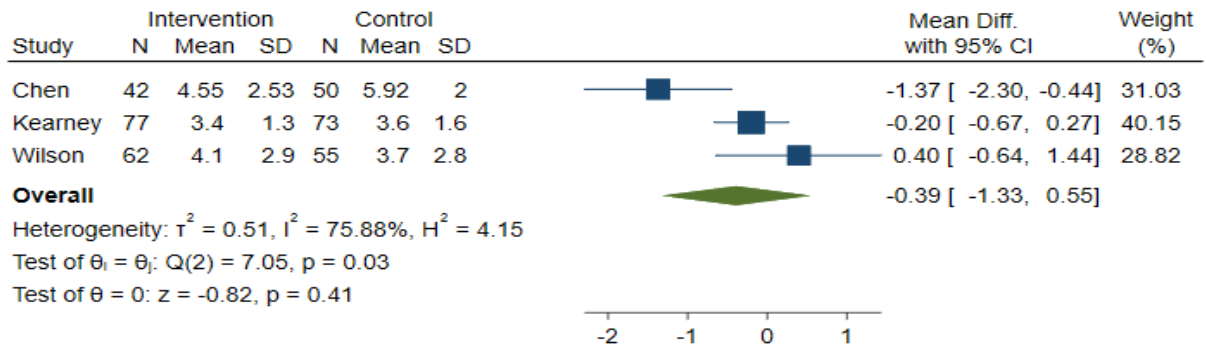
Table-1. Details of selected studies for regular and meta-analysis of the effect of preoperative training on pain after lower extremity joint replacement surgery (hip and knee)

Authors and years	Type of surgery	Pain assessment tool	Consequences	Type of control group training	Type of intervention group training	Results
					Preoperative sessions details	
Su-Ru Chen 2014 ¹³	pain and rehabilitation	Reduce pain	Routine care	total Knee	A 15-minute session the day before surgery A 15-minute session the day after surgery	verbal numerical rating scale
Marge Kearney 2011 ¹⁴	Complications after surgery	No significant effects on pain	Routine care	Total hip/ total Knee	structured preoperative education class	Face to face vas
Alison H. 2004 ¹⁵	pain, function, satisfaction, and quality of life	No significant effects on pain	Standard care	total hip	A rehabilitation class A booklet	Rehabilitation class booklet vas
Rosemary A. Wilson 2016 ¹⁶	Pain and anxiety	No significant effects on pain	Routine care	total hip	One session	Rehabilitation class booklet vas
Marie Cooke 2016 ¹⁷	pain Anxiety Postoperative satisfaction with pain control	No significant effects on pain	Standard care	Total hip/ total Knee	One session	Training by dvd NRS

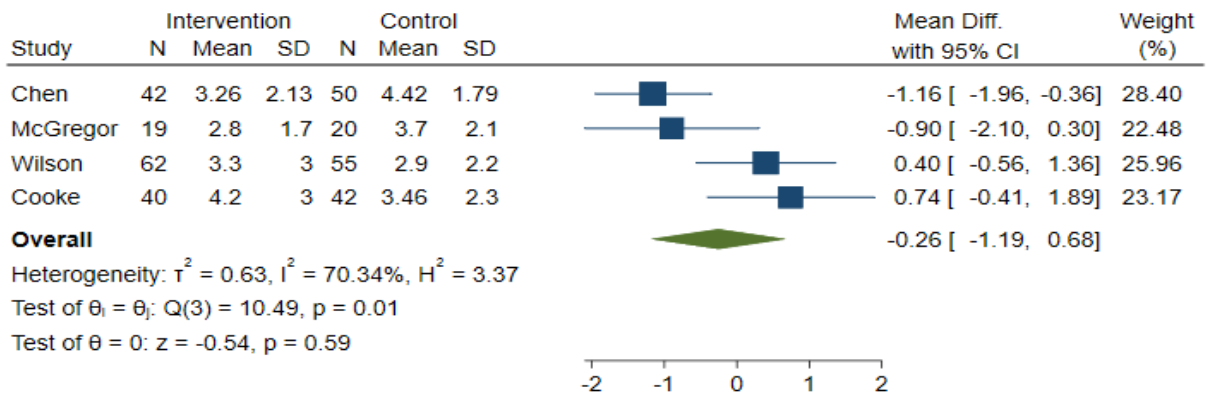
Table-2. Quality of selected articles for meta-analysis of the effect of preoperative training on pain after lower extremity joint replacement surgery (hip and knee)

Study	Randomization	Blindness	Follow up	Analysis of exits	Blinding the results evaluators	Baseline comparison	Same treatment except intervention	Total score
Su-Ru Chen 2014 ¹³	0	0	1	0	0	1	1	3
Marge Kearney 2011 ¹⁴	0	0	1	0	0	1	1	3
Alison H. 2004 ¹⁵	1	1	1	0	0	1	1	5
Rosemary A. Wilson 2016 ¹⁶	1	1	1	0	1	1	1	6
Marie Cooke 2016 ¹⁷	1	0	1	0	1	1	1	5

A



B



C

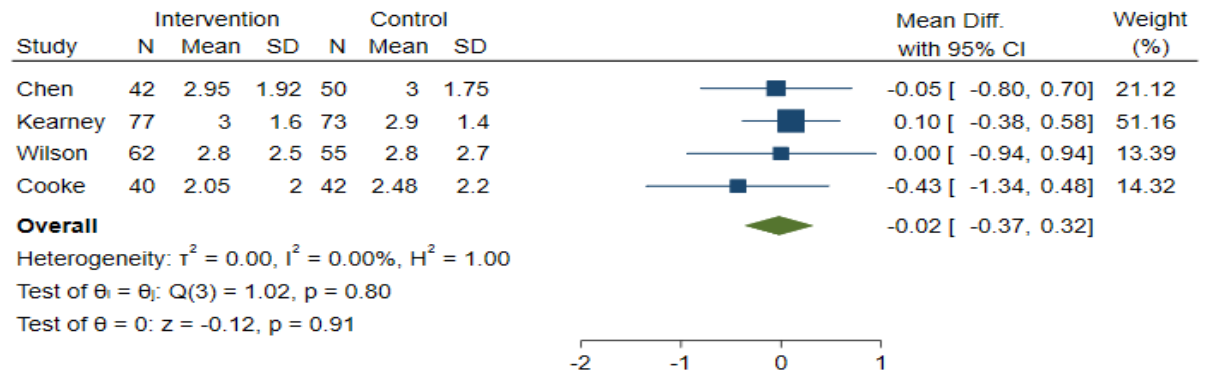
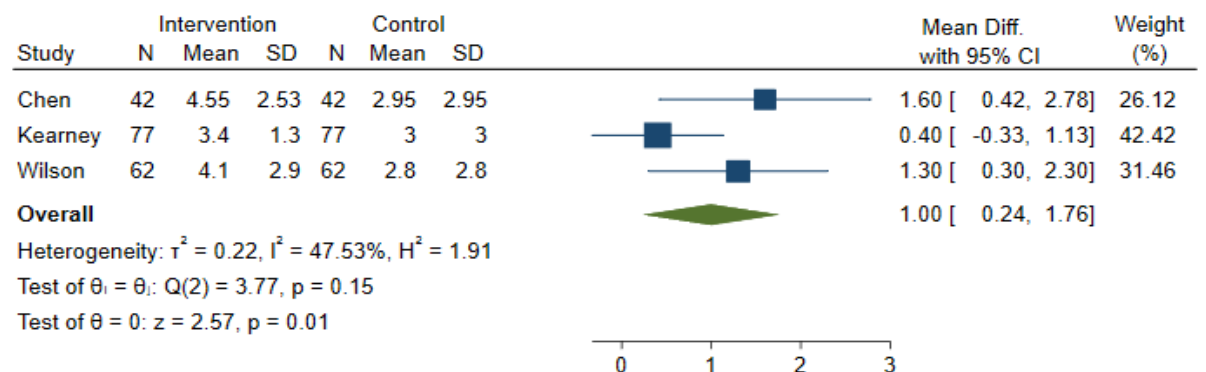


Figure-2. Forest plots displaying the comparisons of pooled mean difference of pain score between intervention and control groups in postoperative day 1 (A), postoperative day 2 (B) and postoperative day 3 (C)

A



B

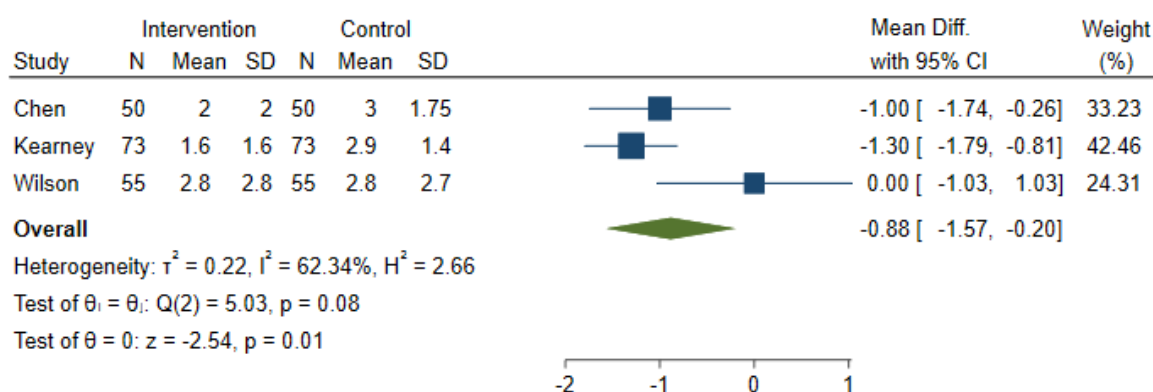


Figure-3. Forest plots displaying the comparisons of pooled mean difference of pain score between postoperative day 1, postoperative day 3 in intervention groups (A) and in control groups (B)

Although the results of the study by Cooke et al., did not show a significant difference between the pain scores of two groups before and after surgery, and they recommended the improvement of self-efficacy intervention, in addition to providing educational DVDs. Providing effective training, holding group discussions focusing on self-efficacy improvement, reducing anxiety, and follow-up can be effective in reducing pain and returning to daily activities.¹⁷

The type of educational content and its systematic presentation to reduce postoperative pain were considered by some studies. Some studies aimed at preventing and reducing the mechanism of pain in the provision of educational content, so that in a study by Aberomand et al., on the reduction of headache in patients undergoing spinal anesthesia, the face-to-face presentation of educational content and materials led to significant results.²⁰ A similar approach was also employed in the study by Sugai et al., on the physiological mechanism of pain.²¹

In Chen et al.,¹³ on the effectiveness of cognitive-behavioral interventions in improving postoperative pain management in patients undergoing hip replacement surgery, no significant results were obtained regarding the improvement of physical function by training rehabilitation exercises. They believed that a proper understanding of pain control enables patients to effectively manage their pain, not just tolerate it. The evaluation of the results showed positive outcomes until day 3, but no significant results were obtained on days 4 and 5. Generally, it seems that the results of studies performed in surgeries requiring long-term follow-ups and care for the management of postoperative were often disappointing. These surgeries are mostly performed on the spine or include complete hip/knee replacement. The results of a review study

by McDonald et al., on the complete hip replacement surgery are consistent with the finding of the present study. They reported that preoperative education might exacerbate the results, compared to the conventional postoperative care.²²

The manner of dealing with the patient is another factor that affects the results of educational interventions. Pereira et al.,²³ used a patient-centered empathetic approach in preoperative interviews that led to the reduction in anxiety and postoperative general pain. Their findings support a model that relied on empathetic communication with the patient. The application of this model led to the mental health and satisfaction of patients with the provided information and accelerated physical recovery. Previous studies indicated that anxiety is associated with the painful recovery and the need for sedatives and analgesics.²⁴

It is noteworthy that if the study is performed in an environment with relatively high educational standards, as regular daily care is provided for the patients, finding significant differences between the intervention and usual care results would be difficult.

Evidence showed that preoperative education, as a complex intervention, could not reduce postoperative pain. The reason for this complexity can be related to the philosophy and nature of education. According to the evidence, a variety of factors can affect the effect of preoperative education on the postoperative pain. Among them, selecting educational content consistent with the patient's needs, type of surgery, and duration of follow-up and continuity of care, method of providing education, quality of the intervention, patient's knowledge regarding pain measurement method, and interactive education with empathy are the most important factors. Many factors are involved in the structure of the

teaching and learning process and its effectiveness. The use of scientific, educational approaches according to the patient's needs can be effective in the transfer of knowledge and concepts and achievement of the ultimate goal of the improvement of cognition, learning, and behavior change. Utilization of structured and comprehensive educational programs with appropriate content can increase patients' awareness and enable them to effectively get involved in self-care, increase self-efficacy, and reduce postoperative complications.²⁵⁻²⁷

The role of the trainer, who may be a qualified and trained nurse, is more evident. The importance of the trainer ability for communication, interaction and empathy with patients in the education process and providing feedback to patients in meaningful learning, control of pain and anxiety is pivotal.

In addition to valuable quantitative research in this field, it is recommended to conduct further qualitative studies.

The limitation of the study was the lack of access to unpublished articles (gray literature). Moreover, since different methods have been used for preoperative surgery in the reviewed articles, the results of this study cannot be trusted with a high certainty.

Conclusions

The present study suggests that pre-THA and TKA training may not significantly reduce pain. However further studies are required to confirm our findings.

Acknowledgments

None.

Authors' Contribution

All authors pass the four criteria for authorship contribution based on the International Committee of Medical Journal Editors (ICMJE) recommendations.

Conflict of Interests

The authors declared no potential conflict of interests with respect to the research, authorship, and/or publication of this article.

Funding/Support

The authors received no financial funding or support for the research.

References

1. Mahmoodpoor A, Abedini N, Parish M, Jannati A, Baradaran R. Efficacy of low dose Interscalene Brachial Plexus Block on post anesthesia recovery parameters after Shoulder Surgery. *Pak J Med Sci.* 2011;27:265-8.
2. Kalogianni A, Almpani P, Vastardis L, Baltopoulos G, Charitos C, Brokalaki H. Can nurse-led preoperative education reduce anxiety and postoperative complications of patients undergoing cardiac surgery? *European Journal of Cardiovascular Nursing.* 2016;15(6):447-58. doi:10.1177/1474515115602678
3. Montes Piñez A, Aguilar J, Benito MdC, Caba F, Margarit C. Management of postoperative pain in Spain: a nationwide survey of practice. 2017. doi:10.1111/aas.12876
4. Aghamohamadi D, Gol MK. Checklist for Determining Severity of Pain and Type and Dosage of Analgesics Administered to Patients Undergoing Breast Surgeries. *International Journal of Women's Health and Reproduction Sciences.* 2020;8(2):227-31. doi:10.15296/ijwhr.2020.36
5. Nir RR, Nahman-Averbuch H, Moont R, Sprecher E, Yarnitsky D. Preoperative preemptive drug administration for acute postoperative pain: A systematic review and meta-analysis. *European Journal of Pain.* 2016;20(7):1025-43. doi:10.1002/ejp.842
6. Gol MK, Aghamohamadi D. Effect of massage therapy with and without elastic bandaging on pain, edema, and shoulder dysfunction after modified radical mastectomy: a clinical trial. *International Journal of Women's Health and Reproduction Sciences.* 2020;8(1):73-8. doi:10.15296/ijwhr.2020.10
7. Pogatzki-Zahn EM, Segelcke D, Schug SA. Postoperative pain-from mechanisms to treatment. *Pain reports.* 2017;2(2). doi:10.1097/PR9.0000000000000588
8. Montazer M, Hadadi Z, Ghavami Z, Khanbabaee Gol M. Relationship of Body Mass Index with Chronic Pain after Breast Surgery in Women with Breast Cancer. *The Iranian Journal of Obstetrics, Gynecology and Infertility.* 2019;22(8):10-8. doi:10.22038/ijogi.2019.13915.
9. Yang MM, Hartley RL, Leung AA, Ronskley PE, Jettü N, Casha S, et al. Preoperative predictors of poor acute postoperative pain control: a systematic review and meta-analysis. *BMJ open.* 2019;9(4):e025091. doi:10.1136/bmjopen-2018-025091
10. Vickers N, Wright S, Staines A. Surgical nurses in teaching hospitals in Ireland: understanding pain. *British Journal of Nursing.* 2014;23(17):924-9. doi:10.12968/bjon.2014.23.17.924
11. Mazilu DC, Zazu M, Nedelcu V, Sfetcu R. Effectiveness of pain management educational interventions on nurses' knowledge and attitudes regarding postoperative pain management: a systematic review protocol. *JB I database of systematic reviews and implementation reports.* 2018;16(2):303-7. doi:10.11124/JBISRIIR-2017-003414
12. Yang M, Hartley R, Leung A, Ronskley P, Jette N, Casha S, et al. P. 121 Preoperative predictors of poor postoperative pain control: systematic review and meta-analysis. *Canadian Journal of Neurological Sciences.* 2018;45(s2):S48-S. doi:10.1017/cjn.2018.223
13. Porras-González MH, Baryn-Lopez FJ, García-Luque MJ, Morales-Gil IM. Effectiveness of the nursing methodology in pain management after major ambulatory surgery. *Pain Management Nursing.* 2015;16(4):520-5. doi:10.1016/j.pmn.2014.09.013
14. Kearney M, Jennrich MK, Lyons S, Robinson R, Berger B. Effects of preoperative education on patient outcomes after joint replacement surgery. *Orthopaedic Nursing.* 2011;30(6):391-6. doi:10.1097/NOR.0b013e31823710ea
15. McGregor AH, Rylands H, Owen A, Dorri CJ, Hughes SP. Does preoperative hip rehabilitation advice improve recovery and patient satisfaction? *The Journal of arthroplasty.* 2004;19(4):464-8. doi:10.1016/j.arth.2003.12.074
16. Leal-Blanquet J, Alentorn-Geli E, Ginis-Cespedosa A, Martiñez-Díaz S, Córceles E, Puig L. Effects of an educational audiovisual videodisc on patients' pre-operative expectations with total knee arthroplasty: a prospective randomized comparative study. *Knee Surgery, Sports Traumatology, Arthroscopy.* 2013;21(11):2595-602. doi:10.1007/s00167-012-2158-4
17. Cooke M, Walker R, Aitken LM, Freeman A, Pavey S, Cantrill R. Pre-operative self-efficacy education vs. usual care for patients

- undergoing joint replacement surgery: a pilot randomised controlled trial. *Scandinavian journal of caring sciences*. 2016;30(1):74-82. doi:10.1111/scs.12223
18. Archer KR, Castillo RC, Wegener ST, Abraham CM, Obremskey WT. Pain and satisfaction in hospitalized trauma patients: the importance of self-efficacy and psychological distress. *Journal of Trauma and Acute Care Surgery*. 2012;72(4):1068-77. doi:10.1097/TA.0b013e3182452df5
 19. Daniali SS, Shahnazi H, Kazemi S, Marzbani E. The effect of educational intervention on knowledge and self-efficacy for pain control in patients with multiple sclerosis. *Materia socio-medica*. 2016;28(4):283. doi:10.5455/msm.2016.28.283-287
 20. Aberomand R, Ravari A, Mirzaei T, Savaie M. Effects of Patient Educational Programs on the Headache Caused by Spinal Anesthesia. *Evidence Based Care*. 2016;5(4):41-50. doi:10.22038/EBCJ.2015.6292
 21. Sugai DY, Deptula PL, Parsa AA, Parsa FD. The importance of communication in the management of postoperative pain. *Hawai'i journal of medicine & public health*. 2013;72(6):180.
 22. McDonald S, Page MJ, Beringer K, Wasiak J, Sprowson A. Preoperative education for hip or knee replacement. *Cochrane Database of Systematic Reviews*. 2014(5). doi:10.1002/14651858.CD003526.pub2
 23. Schmidt M, Eckardt R, Scholtz K, Neuner B, von Dossow-Hanfistingl V, Sehouli J, et al. Patient empowerment improved perioperative quality of care in cancer patients aged ≥ 65 years-a randomized controlled trial. *PLoS One*. 2015;10(9). doi:10.1371/journal.pone.0137824
 24. Kain ZN, Sevarino F, Alexander GM, Pincus S, Mayes LC. Preoperative anxiety and postoperative pain in women undergoing hysterectomy: A repeated-measures design. *Journal of psychosomatic research*. 2000;49(6):417-22. doi:10.1016/S0022-3999(00)00189-6
 25. Rafeey M, Saboktakin L, Hasani JS, Naghashi S. Diagnostic value of anti-smooth muscle antibodies and liver enzymes in differentiation of extrahepatic biliary atresia and idiopathic neonatal hepatitis. *African journal of paediatric surgery: AJPS*. 2016;13(2):63. doi:10.4103/0189-6725.182558
 26. Saboktakin L, Barzegar M, Hagh Jo A, Emamalizadeh M. Study on serum Copper and Zinc level of children with epilepsy during long term therapy with anticonvulsants. *Life Sci J*. 2012;9(4):1250-54.
 27. Gol MK, Dadashzadeh M, Anvari HM. Design and implementation of a checklist for prediction of anesthesia-induced nausea and vomiting in candidate patients for mastectomy. *International Journal of Women's Health and Reproduction Sciences*. 2020;8(1):90-4