Am J Transl Res 2023;15(3):1779-1788
www.ajtr.org /ISSN:1943-8141/AJTR0148005

Original Article

Evidence-based nursing reduces complications and negative emotions and improves limb function in patients undergoing hip arthroplasty

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Received November 25, 2022; Accepted February 9, 2023; Epub March 15, 2023; Published March 30, 2023

Abstract: Objective: This retrospective study primarily analyzed the influence of evidence-based nursing (EBN) on postoperative complications (POCs), negative emotions (NEs) and limb function of patients undergoing hip arthroplasty (HA). Methods: The research participants were 109 patients undergoing HA in Honghui Hospital, Xi'an Jiaotong University from September 2019 to September 2021. Among them, 52 patients who received routine nursing intervention were set as a control group, and 57 patients that received EBN were set as the research group. The POCs (infection; pressure sores, PS; lower extremity deep venous thrombosis, LEDVT), NEs (Hamilton Anxiety/Depression Scale, HAMA/HAMD), limb function (Harris Hip Score, HHS), pain intensity (Visual Analogue Scale, VAS), quality of life (QoL; Short-Form 36 Item Health Survey, SF-36) and sleep quality (Pittsburgh Sleep Quality Index, PSQI) were compared. Finally, the risk factors of complications in patients undergoing HA were identified by Logistic regression. Results: The incidence of POCs such as infection, PS and LEDVT was markedly lower in the research group than that in the control group. The postinterventional HAMA and HAMD scores of the research group were obviously lower than the baseline (before intervention) and those of the control group. The research group also exhibited obviously higher scores in various dimensions of the HHS and SF-36 than the baseline and control group. Moreover, the post-interventional VAS and PSQI scores of the research group were markedly reduced compared with the baseline and those of the control group. Factors including drinking history, place of residence and nursing modality were found to be not associated with an increased risk of complications in patients undergoing HA. Conclusion: EBN can lower the incidence of POCs, mitigate NEs and pain perception, and enhance limb function, QoL and sleep quality in patients undergoing HA, so it is worth popularizing.

Keywords: Hip arthroplasty, evidence-based nursing, postoperative complications, negative emotions, limb function

Introduction

Hip arthroplasty (HA) is one of the most mature surgical procedures for joints, which has been constantly developed and modified for 8 decades since its first application in 1940 [1]. It can be divided into hemi-hip and total HA, which are both commonly used in the clinical treatment of hip fractures [2]. Hip fractures, including femoral neck fractures, intertrochanteric fractures and subtrochanteric fractures, are important causes of morbidity and mortality in the elderly [3]. According to relevant epidemiological statistics, the mortality of elderly patients with hip fractures is between 14% and 58%, and so in the elderly population, hip fracture is called "the last fracture in life" [4, 5]. Guidelines for such conditions often recommend rapid surgical intervention, such as HA, for the best possible outcome [6]. However, post-surgical patients still need long-term nursing, and the choice of nursing modalities can directly affect the frequency and intensity of postoperative complications (POCs) [7]. Therefore, the selection and optimization of nursing programs are essential to the prognosis and quality of life (QoL) of patients undergoing HA.

The intervention methods in routine nursing are relatively simple and rigid, which often fail to meet the actual needs of patients after HA for hip fractures [8]. In a study of clinical outcomes in post-HA patients, nutrition-related issues, including frailty and sarcopenia, were shown to be given limited attention in routine care [9]. In addition, hip fracture patients usually have a high probability of POCs, which leads to increased mortality [10]. Hence, in nursing intervention, it is necessary to take corresponding measures to prevent POCs after HA, so as to lower the probability of POCs in patients. Evidence-based nursing (EBN) is a new approach that considers the patient's explicit conditions and requirements [11]. It is based on valuable, credible and scientific research results, which can be used as evidence to guide and improve clinical practice [12]. In a study by Simon et al. [13] on nausea and vomiting after pediatric surgery, EBN demonstrated its advantages in reducing complications. Additional research on senile osteoporotic fractures suggests the positive effect of EBN on relieving the negative emotions (NEs) of fracture patients [14].

At present, there are many studies on the application of EBN, but few focus on its clinical impact in patients undergoing HA. Consequently, this study creatively compared and analyzed the clinical data from the aspects of POCs, NEs and limb function, hoping to make a contribution to the optimization of clinical management of such patients.

Materials and methods

Patient data

This retrospective study selected 109 patients who underwent HA between September 2019 and September 2021 in Honghui Hospital, Xi'an Jiaotong University as the research participants, including 52 cases (control group) that received routine nursing intervention and 57 cases that received EBN intervention. The baseline data were similar in the two groups (P>0.05), so they were clinically comparable. All eligible cases underwent HA for hip fracture [15], had their first hip fracture and no previous treatment history, were capable of normal communication and cognition, showed high cooperation, had no serious heart, lung, kidney dysfunction or other diseases, nor operative contraindications. The patients were excluded if they had hypertension, diabetes, coagulation dysfunction, other joint diseases, severe infections, incomplete clinical data or primary mental illness. The study was approved by the Ethics Committee of Honghui Hospital, Xi'an Jiaotong University.

Nursing methods

The control group received routine nursing intervention, with the main content as follows: introducing the knowledge of the occurrence, development, sharing prognosis and outcome of hip replacement to patients; conducting wound management to prevent local infection; assisting patients to turn over regularly to avoid pressure sores (PS); strengthening postoperative observation and rehabilitation guidance.

The research group was given additionally EBN intervention, specifically as follows. (1) Setting up an EBN group: the team consisted of attending physicians, head nurses and nurses with a high sense of responsibility and solid skills. The team members received unified nursing knowledge training, so that all the nurses could clarify the concept, nursing significance and knowledge of EBN for hip replacement surgery, and be able to make a corresponding EBN plan according to the patient's conditions. (2) Identifying evidence-based issues: nursing issues during patient care were collected, and based on the physical and psychological conditions of the patient, combined with clinical experience and review of relevant literature, a conference was organized to discuss effective nursing measures and formulate effective care plans. (3) EBN intervention: in terms of psychological care, patients were informed in advance about the surgical methods, preoperative precautions, possible POCs and corresponding treatment measures, so as to improve their compliance, help them establish a correct treatment attitude and ensure their active cooperation with the nursing work. In addition, the nurses helped patients to release NEs about the disease, actively communicate with them and provide psychological counseling in a timely manner. Regarding treatment and nursing, patients were given intravenous antibiotics 30 minutes before skin incision to prevent intraoperative infection and were kept warm during the operation. After HA, nursing measures were taken to prevent POCs. Besides, patients were assisted in turning over regularly, and the sheets were kept clean, so as to avoid PS due to prolonged lying. On the 1st to 2nd day after the operation, patients were instructed to do ankle pump function exercises on the bed, and the ankle joint was slowly flexed and extended to the maximum extent to prevent thrombosis. On postoperative day 3, patients began to perform recumbent flexion, recumbent hip abduction, quadriceps muscle strength training, gluteal muscle contraction training, etc. After acclimatizing to the supine position training, the nurses assisted patients in trying to stand, training muscle strength and joint activities such as knee lifting, hip flexion and hip extension. Finally, walking training was carried out, and crutches or walkers could be used in the early stage. Throughout the rehabilitation training process, nurses gave on-site guidance to patients, and reminded them that the training should be carried out step by step and follow the principle of "slow before fast". Moreover, patients were encouraged to maintain a peaceful state of mind and were given encouragement. In respect of life nursing, patients and their families were informed of relevant dietary taboos. Patients were advised to eat a diet rich in vitamins, high protein and high crude fiber, but no spicy, greasy and cold food, with more intake of fresh fruits and vegetables to promote defecation. According to the patient's recovery, a healthy schedule of work and rest was made, and daily necessities were disinfected and sterilized regularly, so as to provide a good and comfortable rest environment for patients.

Analysis indexes

Patients' POCs, NEs, limb function, pain intensity, QoL and sleep quality were observed and recorded.

In terms of the incidence of POCs, we observed and recorded the number of adverse events such as infection, PS and lower extremity deep venous thrombosis (LEDVT), and calculated the overall incidence.

NEs were evaluated by the Hamilton Anxiety/Depression Scale (HAMA/HAMD) [16]. There are 14 evaluation items in HAMA with scores ranging from 0 to 56, and higher scores represent more serious anxiety. The score of the 17-item HAMD ranges from 0 to 68, with the score in positive association with the severity of depression.

Limb function evaluation was made by the Harris Hip Score (HHS) from the aspects of pain (44 points), function (47 points), deformity (4 points) and range of motion (ROM; 5 points). The score is proportional to the hip function [17].

Pain intensity was assessed using the Visual Analogue Scale (VAS) with a score ranging from 0 to 10 points, and higher scores indicate greater pain [18].

Patients were scored by Short-Form 36 Item Health Survey (SF-36) for their QoL [19]. This scale includes eight dimensions (100 points for each): general health (GH), physical and social functioning (PF/SF), role-physical and emotional (RP/RE), bodily pain (BP), vitality (VT) and mental health (MH). The score is positively related to QoL.

Finally, sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) on a scale ranging from 0 to 21. The score is inversely correlated with sleep quality [20].

Statistical methods

In this study, measurement data and counting data were imported into SPSS21.0 software package for statistical analysis. The inter-group comparison methods of counting data (number of cases/percentage [n/%]) and measurement data (Mean ± SEM) were the χ^2 test and independent samples t test, respectively, with $P<0.05$ as the significance threshold. Multivariate analysis was carried out by Logistic regression to analyze the risk factors of POCs in patients undergoing HA.

Results

Baseline data of the two groups of patients undergoing HA

We found no significant inter-group differences when comparing patients' baseline data (sex, average age, disease course, fracture location, type of replacement, education level, drinking history, residence, etc.) ($P>0.05$), indicating comparability. See **Table 1** for details.

Table 1. Baseline data of two groups of patients undergoing hip arthroplasty [n (%), mean ± SEM]

Factors	n	Control group (n=52)	Research group (n=57)	χ^2/t	P
Sex				0.659	0.417
Male	61	27 (51.92)	34 (59.65)		
Female	48	25 (48.08)	23 (40.35)		
Average age (years old)	109	63.10±9.84	62.25±11.01	0.423	0.673
Course of disease (days)	109	8.88±2.20	9.02±2.40	0.316	0.752
Fracture site				0.269	0.874
Left	52	25 (48.08)	27 (47.37)		
Right	47	23 (44.23)	24 (42.11)		
Bilateral	10	4 (7.69)	6 (10.52)		
Type of replacement				0.156	0.693
Total hip arthroplasty	65	30 (57.69)	35 (61.40)		
Hemihip arthroplasty	44	22 (42.31)	22 (38.60)		
Education level				0.887	0.346
Middle school and above	33	18 (34.62)	15 (26.32)		
Below middle school	76	34 (65.38)	42 (73.68)		
Drinking history				0.880	0.348
Without	62	32 (61.54)	30 (52.63)		
With	47	20 (38.46)	27 (47.37)		
Residence				0.082	0.775
Urban areas	74	36 (69.23)	38 (66.67)		
Rural areas	35	16 (30.77)	19 (33.33)		

Table 2. Incidence of postoperative complications in two groups of patients undergoing hip arthroplasty [n (%)]

Categories	Control group (n=52)	Research group (n=57)	χ^2 value	*P* value
Infection	2 (3.85)	1 (1.75)	-	-
Pressure sores	4 (7.69)	2 (3.51)	-	-
Lower extremity deep venous thrombosis	3 (5.77)	0 (0.00)	-	-
Total incidence	9 (17.31)	3 (5.26)	4.027	0.045

Incidence of POCs in the two groups of patients undergoing HA

We recorded the POCs (infection, PS and LEDVT) of patients to verify the influence of two nursing modalities on POCs (**Table 2**). The overall incidence of POCs was determined to be significantly lower in the research group than in the control group (5.26% vs. 17.31%, P<0.05).

Analysis of risk factors affecting POCs in patients undergoing HA

Multivariate model was used to analyze the risk factors affecting the occurrence of POCs in patients undergoing HA (**Table 3**). It was revealed that sex, age, course of disease, site of onset, type of replacement, education level, drinking history, residence and nursing modality were not correlated with the increased risk of POCs in patients undergoing HA (P>0.05).

NEs of both groups of patients undergoing HA

We analyzed HAMA and HAMD scores in both groups of patients to evaluate the influence of the two nursing modalities on patients' NEs (**Figure 1**). The data showed no significant inter-group difference in either score before the intervention (P>0.05). The postinterventional HAMA and HAMD scores of both groups decreased remarkably (P<0.05), and the scores were obviously lower in the research group than in the control group (P<0.05).

Table 3. Analysis of risk factors affecting POCs in patients undergoing hip arthroplasty

Factors	B	SE	Wald	P	OR (95% CI)
Sex	1.366	0.885	2.380	0.123	3.919 (0.691-22.217)
Age	0.050	0.037	1.825	0.177	1.051 (0.978-1.130)
Course of disease	-0.170	0.155	1.196	0.274	0.844 (0.623-1.144)
Site of onset	-0.617	0.639	0.931	0.335	0.540 (0.154-1.889)
Type of replacement	0.736	0.813	0.821	0.365	2.088 (0.425-10.271)
Education level	-1.575	0.824	3.652	0.056	0.207 (0.041-1.041)
Drinking history	-0.719	0.784	0.842	0.359	0.487 (0.105-2.263)
Place of residence	0.247	0.980	0.064	0.801	1.280 (0.188-8.738)
Nursing modality	1.352	0.862	2.459	0.117	3.864 (0.713-20.931)

POCs, postoperative complications.

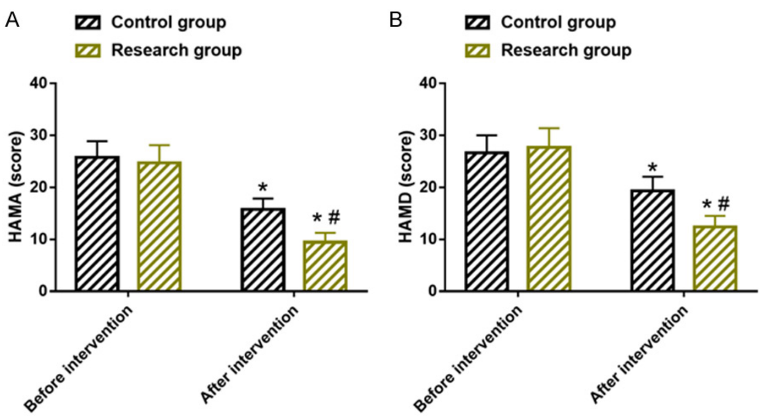

Figure 1. Negative emotions of two groups of patients undergoing hip arthroplasty. A. HAMA scores of patients undergoing hip arthroplasty. B. HAMD scores of patients undergoing hip arthroplasty. Note: * represents P<0.05 compared with before intervention; # represents P<0.05 compared with the control group. HAMA, Hamilton Anxiety Scale; HAMD, Hamilton Depression Scale.

Limb function of the two groups of patients undergoing HA

We used the HHS to analyze the limb function of the two groups in dimensions of pain, function, deformity and ROM (**Figure 2**). Similarly, the data revealed no significant inter-group difference in the scores of pain, function, deformity and ROM before the intervention (P>0.05). The scores of all these dimensions exhibited a significant upward trend after the intervention (P<0.05), with more obvious increases in the research group as compared to those in the control group (P<0.05).

Postoperative pain levels in the two groups of patients undergoing HA

We used the VAS scale to analyze patients' postoperative pain (**Figure 3**). The pre-interventional VAS scores of the control and research groups were (5.71±0.70) and (5.70±0.78), respectively, and the post-interventional VAS scores were (2.46±0.50) and (1.77±0.42), respectively. It can be seen that the VAS was similar in both patient cohorts before intervention (P>0.05), but the scores decreased markedly after intervention in both groups, and the score in the research group was lower than that of the control group after intervention (P<0.05).

QoL of both groups of patients undergoing HA

Using the SF-36 scale, we comprehensively analyzed patients' QoL from eight dimensions to evaluate the influences of the two nursing models on patients' QoL (**Figure 4**). The data determined statistically elevated QoL scores in all the eight dimensions in the research group compared with the baseline and those in the control group (P<0.05).

Sleep quality of patients undergoing HA

We used the PSQI scale to evaluate the sleep quality of patients in the two groups, so as to compare the influence of the two nursing methods on patients' sleep quality (**Figure 5**). The data showed reduced PSQI score in the research group after intervention when comparing with the baseline and the score in the control group, with statistical significance (P<0.05).

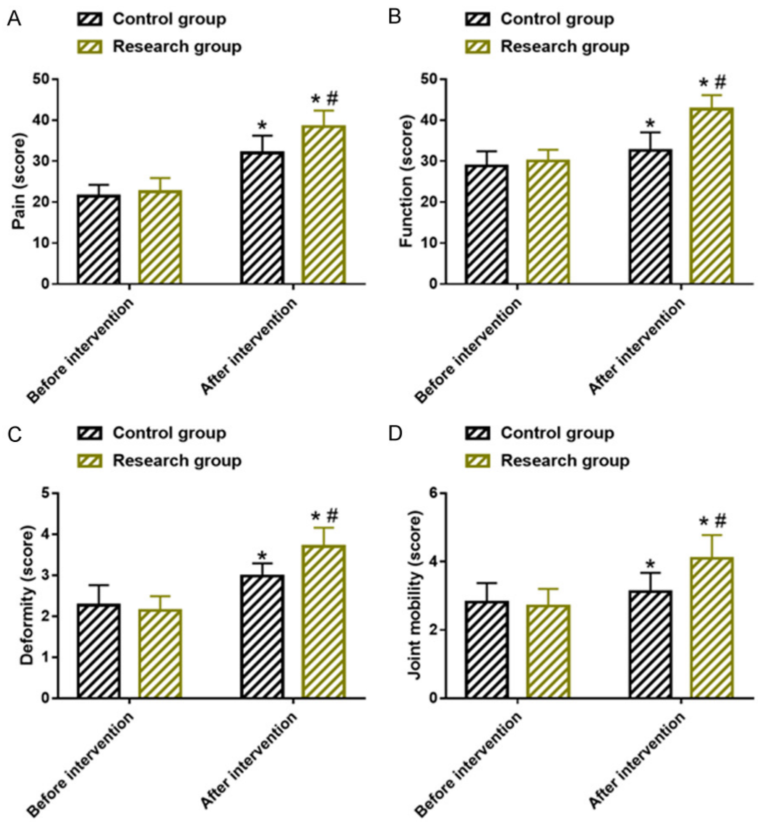

Figure 2. Limb function of two groups of patients undergoing hip arthroplasty. A. Pain scores of patients undergoing hip arthroplasty. B. Function scores of patients undergoing hip arthroplasty. C. Deformity scores of patients undergoing hip arthroplasty. D. Range of motion scores of patients undergoing hip arthroplasty. Note: * represents P<0.05 compared with before intervention; # represents P<0.05 compared with the control group.

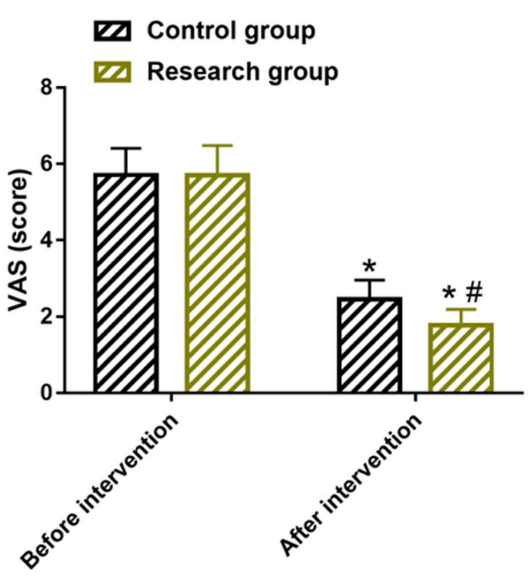

Figure 3. Postoperative pain in two groups of patients undergoing hip arthroplasty. * represents P<0.05 compared with before intervention; # represents P<0.05 compared with the control group. VAS, Visual Analogue Scale.

Discussion

Hip fractures show an upward trend annual in Asia and are expected to rise from 26% in 1990 to over 50% in 2050, making it a major problem worldwide [21, 22]. Among many surgical procedures to treat hip fractures, HA is the first choice as it has been indicated by past clinical applications to facilitate early ambulation and reduce POCs [23]. Given the high prevalence, in addition to ensuring the quality and safety of surgery, the scientific management of the perioperative period is also key to improving the quality of medical services [24]. Therefore, this study centered on the patients undergoing HA, with EBN as a starting point, hoping to contribute to the prevention of POCs in such patients and provide new references for clinical practice in this field.

A total of 109 patients undergoing HA were included and divided into a control group (routine care) and a research group (EBN interventions) based on the care they received. Complications often occur after HA, seriously hindering the recovery process of patients [25]. In this study, we analyzed the risk factors affecting the occurrence of POCs in patients, and the results revealed that factors such as disease course, site of onset and nursing modality were not associated with the increased risk of POCs after HA, suggesting that the use of postoperative care interventions did not adversely affect POCs in such patients. Then we recorded and analyzed the POCs. Only 3 of the 57 patients in the research group had postoperative infection and PS, with an overall incidence remarkably lower than that in the control group (5.26% vs. 17.31%). This indicates that EBN is safer for patients undergoing HA, which accords with the research of Mori et al. [26], which found that EBN reduced postoperative infection. The reason may be that to prevent POCs, targeted measures, such as turning over regularly, keeping sheets clean and exercising ankle pump func-

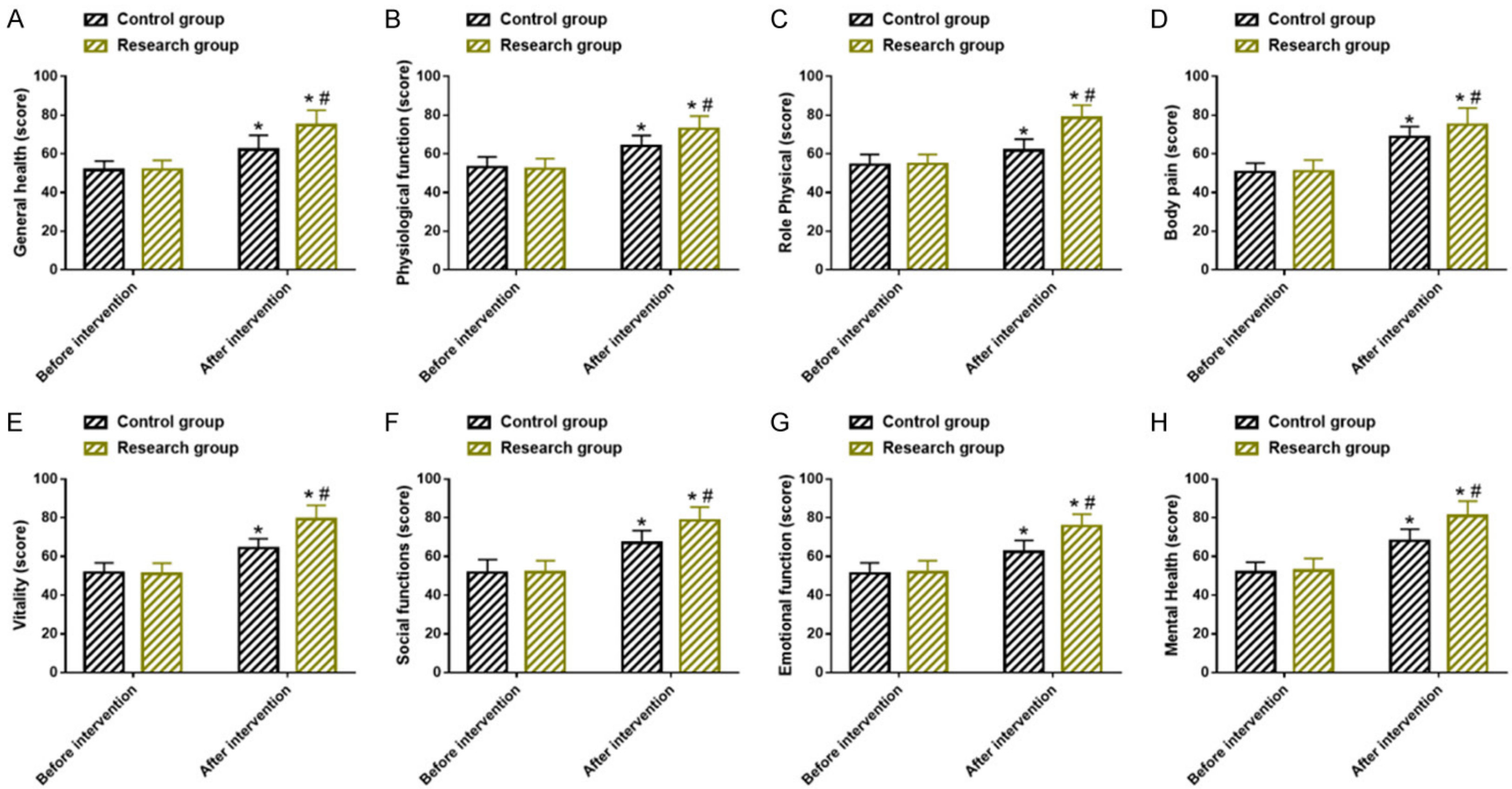

Figure 4. Quality of life of two groups of patients undergoing hip arthroplasty. A. Overall health scores of patients undergoing hip arthroplasty. B. Physical function scores of patients undergoing hip arthroplasty. C. Role-physical scores of patients undergoing hip arthroplasty. D. Bodily pain scores of patients undergoing hip arthroplasty. E. Vitality scores of patients undergoing hip arthroplasty. F. Social function scores of patients undergoing hip arthroplasty. G. Role-emotional scores of patients undergoing hip arthroplasty. H. Mental health scores of patients undergoing hip arthroplasty. Note: * represents $P<0.05$ compared with before intervention; # represents $P<0.05$ compared with the control group.

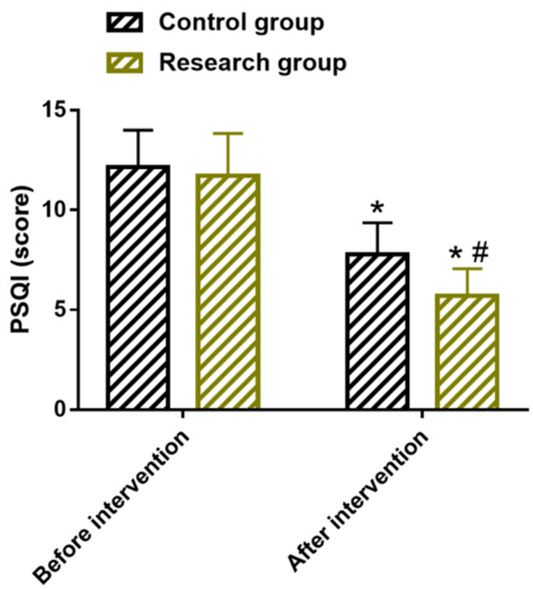

Figure 5. Sleep quality of the two groups of patients undergoing hip arthroplasty. Note: * represents P<0.05 compared with before intervention; # represents P<0.05 compared with the control group. PSQI, Pittsburgh Sleep Quality Index.

tion, were taken during EBN, which are more flexible and targeted than conventional nursing measures. For most patients undergoing HA, there will be NEs of varying degrees when the limb function is not recovered after surgery, with an increased probability of postoperative depression [27, 28]. Fortunately, such NEs tend to decrease over time, with some evidence suggesting that nursing care can alleviate the degree and duration of postoperative NEs [29]. Thus, we recorded the HAMA and HAMD scores that were able to reflect the changes and differences of patients' NEs. The results showed well relieved NEs in both groups after nursing intervention, especially in the research group, suggesting better effects of EBN on the alleviation of patients' NEs after HA. The difference in NEs is largely due to the psychological nursing measures during EBN, which start with helping patients establish a correct treatment attitude, and then give timely communication and counseling when they develop NEs. In a study on the application of EBN after breast augmentation, EBN is indicated to improve the mental health level of patients, which supports our findings [30]. As far as patients' limb function is concerned, the research group scored higher in all the four dimensions of the HSS, suggesting that EBN can effectively improve patients' hip function. This is related to the application of step-by-step rehabilitation training in nursing measures, which are helpful to the recovery of patients' joint function and ROM. In terms of postoperative pain, the post-interventional VAS score was markedly lower in the research group than in the control group, indicating that the implementation of EBN can effectively reduce postoperative pain in patients undergoing HA, which is consistent with the conclusion of Chen et al. [31] on EBN after hip fracture in the elderly. This study also evaluated patients' QoL using SF-36 from eight dimensions, and determined a significant difference in the QoL between the control group and the research group. The significantly better QoL in patients in the research group who received EBN intervention is because nurses gave relevant guidance and suggestions to patients and their families from the aspects of diet, daily schedules and environment, and created a living environment that is conducive to patients' recovery. In people with sleep disorders, EBN has significantly improved their sleep quality by implementing evidence-based sleep treatments [32, 33]. Different from previous studies, we evaluated the difference in sleep quality between patients who received EBN and routine nursing after undergoing HA, and determined markedly lower PSQI scores in the research group than in the control group, suggesting that EBN can effectively improve the sleep quality of patients undergoing HA.

While this study confirms the feasibility of EBN for patients undergoing HA, there are still some shortcomings. First of all, the sample size was small with only 109 cases included, so the number of subjects should be expanded to improve the accuracy of the findings. Second, this study only detected the POCs of patients, but did not follow up patient recovery and recurrence. In the future study, we will address these deficiencies and continue to optimize the nursing plan.

To sum up, EBN interventions can effectively reduce POCs in patients undergoing HA, improve their limb function, alleviate NEs, and validly enhance their QoL and sleep quality. This care model provides an effective nursing approach for the postoperative management of patients undergoing HA, so it is worth popularization in clinical practice.

Disclosure of conflict of interest

None.

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