Effectiveness of a Rehabilitation Self-Efficacy Program on Postoperative Outcomes in Older Adults with Hip Fracture: A Randomized Controlled Trial

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Abstract: Older adults with hip fractures who have undergone surgery require long-term care to relieve pain, improve physical function, and enhance their quality of life. Thus, continuing postoperative care is imperative for quick recovery. This randomized controlled trial examined the effectiveness of a rehabilitation self-efficacy program to enhance postoperative outcomes, including exercise self-efficacy, pain, activities of daily living, strength of muscles, and quality of life. Fifty-eight Thai older adults were randomly assigned to the intervention (n = 29) and control groups (n = 29). The intervention group received the eight-week intervention, while the control group received only usual care. Data were collected through questionnaires, including the Self-Efficacy Quadriceps and Gluteal Exercise Questionnaire, the Numeric Pain Rating Scale, the Modified Barthel Activity of Daily Living Index, and the Mini-Osteoarthritis of Knee and Hip Quality of Life Questionnaire. A hand-held dynamometry was used to assess quadriceps muscle strength. Data were analyzed using descriptive statistics and a two-way multivariate analysis of variance with repeated measures.

The results revealed that the intervention group showed significantly higher exercise self-efficacy and activities of daily living, but less pain than the control group at discharge, and 2 and 8 weeks after hospital discharge. The quadriceps muscle strength and quality of life in the intervention group were significantly higher than those in the control group at 8 weeks after hospital discharge. It can be concluded that this program is effective. Nurses should integrate into this program in practice to enhance overall care quality for older adults with hip fractures. However, further testing in various settings is required before the program is widely used.

Keywords: Activities of daily living, Exercise self-efficacy, Hip fracture, Muscle strength, Older adults, Pain, Quality of life, Rehabilitation Program

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Introduction

The incidence of hip fractures has been continuously increasing globally among the older population, including in Thailand. In the Asia Pacific, it ranges from 89 to 341 per 100,000 people,[1] and older adults with hip fractures in Thailand was projected to grow from 23,426 to 34,246 persons from 2006 to 2025.[2] Falling is a significant cause of hip fractures in older adults despite low energy impact injury. Normally, older adults with hip fractures require surgical intervention, including internal fixation and hip arthroplasty. Monitoring postoperative recovery is required during hospital admission and periodic follow-up after discharge to evaluate postoperative health outcomes. Older adults may experience slower recovery or healing compared to younger adults after surgery. Postoperative outcomes for older adults following hip surgery include being expected to enable a return to normal activities. However, some individuals may not achieve these expected outcomes due to fear of falling and limited activities or functions, resulting in a loss of physical ability, especially when walking.[3] To support postoperative recovery in physical, psychological, social, and habitual aspects, patients should be free from pain, capable of performing daily activities, free from anxiety and depression, and able to enjoy a good quality of life.[4] In Thailand, the guideline for the surgical management of hip fractures in older adults recommended that substantive care consist of preparing for surgery, pain management, prevention of post-surgery complications, continuing care, and prevention of falling and re-fracture.[5]

Previous studies recommended planning the discharge of older adults with hip fractures as early in the admission process. These individuals should be prepared physically and mentally and motivated to recover their capability to perform activities of daily living (ADL).[6] However, a recent study has found that older adults with hip fractures post-surgery do not reach preferable post-surgical recovery or health outcomes. Evidence supports that the people decreased functional abilities 1-month post-surgery, and they still experienced a decline in performing their daily activities and mobility, resulting in deteriorated QOL.[7] Moreover, uncertainty over their ability to recover due to their advancing age and co-morbidities and a lack of social capital—professional support, social network, and institutional care quality, affected the successful recovery.[8,9] Rehabilitation is crucial for helping them return to their previous level of function before fractures. Previous studies have demonstrated the effectiveness of rehabilitation in older adults with hip fractures, which consisted of exercises, such as balancing,[10] strengthening,[11] and resistive exercise[12] that could improve muscle strength. Muscle strength is particularly important as it helps increase physical activity, balance, and walking. In addition, a well-designed rehabilitation program can improve health outcomes, specifically in ADL and QOL. Therefore, this study intended to develop and test the interventions integrated with educating and enhancing self-confidence rehabilitation of older adults to recover post-hip surgery that is imperative to promote appropriate recovery, the ability to perform activities of daily life, enhance physical function, and increase their quality of life.

Review of Literature and Conceptual Framework

This study used exercise self-efficacy as derived from Bandura's self-efficacy theory,[13] to develop the Rehabilitation Self-Efficacy Program (RSEP) for older adults with hip fractures. Self-efficacy is a well-known concept used to guide interventions to promote exercise practice in this study by increasing an individual's confidence and motivation to improve long-term health behavior.[13] Self-efficacy is defined as a person's self-capability judgments to organize and practice the behavior required to successfully perform a specific task through the four sources of self-efficacy: mastery experience, emotional or

physical states, persuasion, and vicarious experiences.[13] Application of these four sources to promote exercise are: 1) mastery experience: training exercises that help promote effort, ability, and confidence in successfully performing exercise among older adults; 2) vicarious experience: providing an opportunity for older adults with hip fractures to meet with those who successfully performed exercises and recovered early; 3) verbal persuasion: providing information about self-rehabilitation, motivation, and praise to enhance the ability of older adults to rehabilitate; and 4) physiological and affective states: reduce fear and anxiety by assessing the older adults' feelings regarding continuous exercises with support and encouragement. These were used to continuously establish self-confidence in older adults with hip fractures participating in the intervention in performing exercises including quadricep muscle and hip muscle exercises, pain management, lifestyle modification, and walking.

A recent scoping review in people with lower limb fractures revealed that building motivation using persuasion, positive reinforcement, and avoiding negative emotion helps increase people's adherence to a rehabilitation program.[14] In addition, self-efficacy enhanced exercise adherence to rehabilitation among people after hip arthroplasty surgery.[15] An earlier study found that before participating in the intervention, older adults with hip fractures undergoing total hip arthroplasty had low to moderate self-efficacy behavior, but they had significantly higher self-efficacy behavior after enrolling in the intervention.[16] Of note, integrating self-efficacy is essential to create the confidence to engage in health behaviors such as performing exercises, lifestyle modification, and using walking aids resulting in better life quality, particularly in older adults who suffered a hip fracture.[17] According to the scoping review, four exercise-based intervention studies involved various types of exercise, such as muscle strength training, balance training, and weight-bearing exercises. The results showed a significant improvement in ADL. In addition, three studies demonstrated a significant increase in muscle strength in older adults who underwent hip surgery.[18]

Aims and Hypothesis

To extend from previous studies, this study aimed to develop and test the effectiveness of the Rehabilitation Self-Efficacy Program (RSEP) with the following hypotheses: 1) mean scores of exercise self-efficacy and activity of daily living in the intervention group would be significantly higher, whereas the mean score of pain would be significantly lower than those in the control group at discharge, two, and eight weeks after hospital discharge; 2) the mean scores of quadriceps muscle strength and quality of life in the intervention group would be significantly higher than those in the control group at eight weeks after hospital discharge.

Methods

Design: A double-blind randomized controlled trial was carried out. The CONSORT (Consolidated Standards of Reporting Trials) 2010 checklist guideline was used to guide this report.

Sample and Setting: The sample was older adults with hip fractures who were admitted to a tertiary university hospital in Thailand and had undergone hip surgery within three days. The participants were recruited based on the inclusion criteria: aged 60 years and over, having undergone their first time of hip surgery, no cognitive impairment evaluated by the Mini-Cog-Thai version,[19] being able to perform ADLs independently before hip fractures as determined by the Modified Barthel Activity of Daily Living Index,[20] and having caregivers. Participants with acute major illnesses, uncontrolled comorbidities (i.e. acute heart failure, end-stage renal disease), or those who did not comply with the study protocol were excluded.

The sample size for the study was calculated using G*power software (version 3.1.9.2), considering a repeated-measures multivariate analysis of variance with a power of 0.90, an alpha of 0.05, and *d* of 0.48 (*f* 0.24).[21] Based on that program calculation, the total sample size required was 48 individuals, and an

additional 20% was added to account for potential dropouts in the prospective study, resulting in a final sample size of 58 individuals. The sample was recruited according to the inclusion criteria, and then matched according to gender, age, and surgical type; after that, they were randomly assigned into either the intervention or control group by random sampling without replacement, as shown in **Figure 1**.

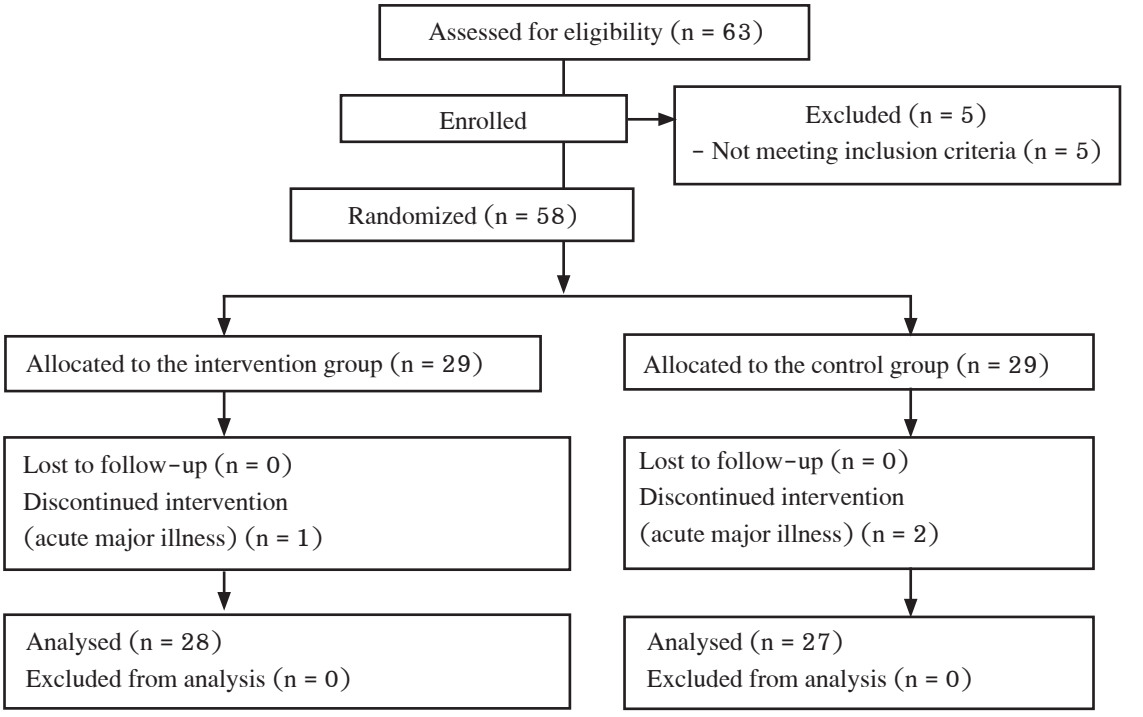

Figure 1. The flow of participants through the trial

Ethical Considerations: This study protocol was approved by the Human Research Ethics Committee of the Faculty of Medicine, Vajira Hospital, Navamindradhiraj (COA 207/2020, on 29th December 2020). Before the study, the participants were approached, and explanations were given about the study procedures, their right to consider whether to participate or decline, and all relevant information regarding confidentiality, potential risks, and benefits. Also, the participants were assured that their decision to withdraw from the study would not affect any services they were receiving. Their information would be kept confidential and kept in a secure place accessible only to the research team, and all data would be destroyed at the end of the study. The results would be presented with overall groups that could not be referred to any individual participants.

Research Instruments: The instruments used in this study were divided into two parts: six instruments for data collection and the intervention program. The instruments were as follows.

A Demographic and Health Data Form was developed by the principal investigator (PI), comprising gender, age, marital status, educational level, weight, height, income, comorbidities, and caregivers.

The Self-Efficacy Quadriceps and Gluteal Exercise Questionnaire (SEEQ) developed by the PI is based on the self-efficacy theory. It contains 12 items with yes/no responses. The scoring is assigned as 0 (no), 1 (uncertain), 2 (yes) for positive questions,

whereas the score is reversed for negative items. The total score ranges from 0 to 24; higher scores indicate greater self-efficacy, and an example item is "You can strengthen both thigh muscles almost every day or every day." Content validity was verified by three orthopedic experts: the CVI was 0.80, and reliability testing in 30 older adults with similar characteristics to the study participants showed Cronbach's alpha coefficients of 0.81. In the present study with 58 participants, Cronbach's alpha coefficient was 0.92.

The Numeric Pain Rating Scale (NPRS) is a standardized scale, a single-item question used to evaluate hip pain intensity during the previous 24 hours. This pain intensity scale has 11 points ranging from 0 to 10; 0 indicates no pain, while 10 designates execrable pain. The test-retest reliability in a pilot study of 30 older adults, with a duration of 8 hours between pre-and post-test, indicated a correlation of 0.94.

The Modified Barthel Activity of Daily Living Index (MBI) was used with permission to assess the participants' ability to independently perform ADLs before and after surgery. The original MBI is in English. It was later translated and modified into a Thai version,[20] comprising 10 items, including feeding, grooming, transfer, toilet use, mobility, dressing, stairs, bathing, bowel, and bladder. Each item is rated on a scale from 0 to 3. The lowest score is 0, indicating higher dependence, while the highest is 20, indicating higher independence. Also, a total score is classified as 0-4 (total dependence), 5-8 (severe dependence), 9-11 (moderate dependence), and 12-20 (mild dependence). In a pilot study with 30 individuals, Cronbach's alpha coefficient was 0.88; in the present study, it was 0.84.

The handheld dynamometry (HHD) (Lafayette Manual Muscle Testing System Model-01165) was used to measure the isometric muscle contraction with the extended knee to determine the strength of the quadriceps muscle. Quadriceps muscle strength is calculated by torque (force [newtons] x distance between the knee joint and pressing area [meter]) per kilogram of body weight.[22] Higher values indicate greater muscle strength. The interrater reliability between a researcher and a research assistant was 0.95 when tested in 10 older adults post-hip surgery.

The Mini-Osteoarthritis of Knee and Hip Quality of Life (Mini-OAKHQOL) was used to measure the quality of life of older adults with hip fractures.[23] It comprises 20 questions classified into five dimensions: mental health (3 items), pain (3 items), physical activities (7 items), social functioning (2 items), social support (2 items), as well as three independent items. Each item is rated on a scale from 0 to 10. The total raw score for each dimension and all dimensions was converted to a normalized score, ranging between 0 (worst QOL) and 100 (best QOL); a high score reflects high QOL. An example item is "I have difficulty walking." The original version of the *Mini-OAKHQOL* is in French, and then was translated into Thai by Aree-Ue et al.[24] It was used with permission. In this study, two items concerning sexual and occupation were not practical for older participants, so only 18 items were selected. The Cronbach's alpha coefficient was 0.93 in a pilot study of 30 cases, and 0.86 in this present study.

The Rehabilitation Self-Efficacy Program (RSEP) and Implementation

This program was developed by the PI based on Bandura's self-efficacy theory[13] and a literature review. It consisted of four components: 1) health information, 2) quadriceps and gluteal training exercise, 3) monitoring and encouraging postoperative recovery—muscle exercises and walking, and 4) home monitoring via telephone or LINE applications.

The Booklet and *Video Animation* entitled "Rehabilitation in Older Adults with Hip Fracture" provided information and visuals about hip fracture knowledge, pre-post surgery rehabilitation, and at-home-based recovery after discharge.

The Quadriceps and Gluteal Exercise Log was designed to help older participants or their caregivers record and monitor adherence to home quadriceps and gluteal muscle exercises.

A Telephone Log was used to monitor participants' health behavior via phone calls or the LINE application.

The program was reviewed by three experts in the orthopedic area, including an orthopedic surgeon, an orthopedic nurse, and an orthopedic nurse instructor. The content validity index (CVI) was 0.96.

For implementation, the intervention group received the RSEP, which consists of 1-2 weeks in the hospital and an 8-week intervention after discharge. Before starting activities in each session, the participants received pain management, including medication, cold compression, and proper position to lessen pain. The pain score had to be 3 or lower. Importantly, the intervention such as exercise must not increase pain. The RSEP was delivered in four sessions from hospitalization until after hospital discharge. The details of the time and content of the program implementation are shown in **Appendix Table 1.**

Usual care

The usual care provided by the health care provider included health information about ankle pumping and hip exercise, proper positioning, walking, and post-surgery complications through a text leaflet. After surgery, the older adults were trained to walk with a walker, but some were recommended to avoid weight bearing. These older adults were discharged to their homes with wheelchairs. When discharged home, they had a two-week follow-up period at the orthopedic outpatient department. To control the contamination between groups, the PI allocated the participants in the intervention and control groups into separate rooms.

Data Collection: The study was conducted from January 2021 to March 2022. After obtaining ethical approval, the PI recruited the older adults with hip fractures based on specific criteria and randomly assigned them to either the intervention or control groups. The PI informed them about the research study, asked if they would participate, and asked them to sign an informed consent form. The PI provided the intervention to each participant in the experiment group with all essential components of the RSEP to ensure intervention fidelity. Research assistants were trained to measure the strength of the quadriceps muscle and collect data. Activities of daily living (ADL), pain, and exercise self-efficacy were evaluated at baseline, discharge, and the 2nd and 8th weeks after discharge. Quadriceps muscle strength and quality of life (QOL) were assessed at baseline and the 8th week after discharge. The research assistants who collected the data were unaware of the group's status.

Data Analysis: The Statistical Package for the Social Sciences (version 28), licensed to Navamindradhiraj University, was used to analyze the data. The demographic information of the participants was analyzed using descriptive statistics. To examine the differences in the mean scores of the outcome variables between the control and the intervention groups, a multivariate analysis of variance and two-way multivariate analysis of variance with repeated measures were performed. All assumptions were met before conducting statistical analysis.

Results

In this study, 58 participants were initially recruited, but due to critical conditions, only 55 could be allocated to the control and intervention groups, as illustrated in **Figure 1**. Females predominated in the control and intervention groups (77.8% and 75%, respectively). The body mass indexes of both the control and intervention groups were within a normal range. The types of fracture and surgery did not differ between the groups; all participants used a walker after surgery. There were no significant differences in the outcome or the participants' demographics before intervention implementation **(Table 1)**.

Table 1. Characteristics of the intervention and control groups (N = 55)

Participant characteristics	Intervention group (n = 28)		Control group (n = 27)		Total		χ^2	p-value
	n	%	n	%	n	%		
Gender							0.06	0.808
Female	21	75.00	21	77.80	42	76.40		
Male	7	25.00	6	22.20	13	23.60		
Age (years)							1.54	0.463
Young-old (60-69)	6	21.40	5	18.50	11	20.00		
Middle-old (70-79)	8	28.60	12	44.50	20	36.40		
Old-old (80-89)	14	50.00	10	37.00	24	43.60		
Body mass index (kg/m^2)							1.06	0.589
Underweight (< 18.5)	5	17.90	4	14.80	9	16.40		
Normal (18.5-24.9)	18	64.20	15	55.60	33	60.00		
Overweight/Obese (25-35)	5	17.90	8	29.60	13	23.60		
Comorbidities							1.74	0.188
Yes	23	82.10	18	66.70	41	74.50		
No	5	17.90	9	33.30	14	25.50		
Type of fracture							0.18	0.671
Neck of femur	15	53.6	16	59.3	31	56.4		
Intertrochanteric	13	46.4	11	40.7	24	43.6		
Type of Surgery							0.03	0.874
Hip arthroplasty	16	57.1	16	59.3	32	58.2		
Internal fixation	12	42.9	11	40.7	23	41.8		

All the outcome variables for the intervention group showed improvement from the baseline as expected, as shown in **Table 2** and **Figure 2.** Both time and intervention had a significant impact on these outcome variables. Moreover, both ADL and pain showed a significant interaction between time and intervention.

Table 2. Main effects of the rehabilitation self-efficacy program, time, and interaction effect (N = 55)

Variable	Time (week)	Group		F Group	F Time	F Group* Time	η_p^2
		Intervention M (SD)	Control M (SD)				
ESE				25.08***	6.40**	1.48	
	baseline	30.43 (3.20)	28.15 (7.51)				
	discharge	32.79 (2.97)	27.67 (5.02)				0.287
	2 weeks[a]	34.46 (2.95)	29.70 (4.66)				0.280
	8 weeks[b]	34.57 (3.27)	29.59 (6.42)				0.200
Pain				4.22*	76.91***	2.89*	
	baseline	7.00 (1.92)	6.78 (2.26)				
	discharge	4.14 (2.08)	4.52 (1.67)				0.010
	2 weeks[a]	2.68 (1.91)	3.37 (2.13)				0.030
	8 weeks[b]	1.36 (1.47)	3.04 (1.45)				0.255
ADL				4.16*	64.23***	3.19*	
	baseline	7.46 (3.96)	7.30 (3.01)				
	discharge	10.25 (4.23)	9.74 (4.65)				0.003
	2 weeks[a]	13.93 (4.48)	11.59 (3.90)				0.074
	8 weeks[b]	16.86 (2.89)	13.52 (4.16)				0.185

Note. ESE = exercise self-efficacy; ADL = activities of daily living; [a] = 2 weeks after discharge, [b] = 8 weeks after discharge; Two-way repeated measures MANOVA disclosed comprehensive Pilai's Trace group ($p < 0.001$), time ($p < 0.001$), and group*time ($p < 0.05$); Greenhouse-Geisser univariate is delineated preceding; *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ for assessing the significance; η_p^2 = partial eta square/ effect size as small ($\eta_p^2 = .01$); moderate ($\eta_p^2 = .06$); or large ($\eta_p^2 = .14$)

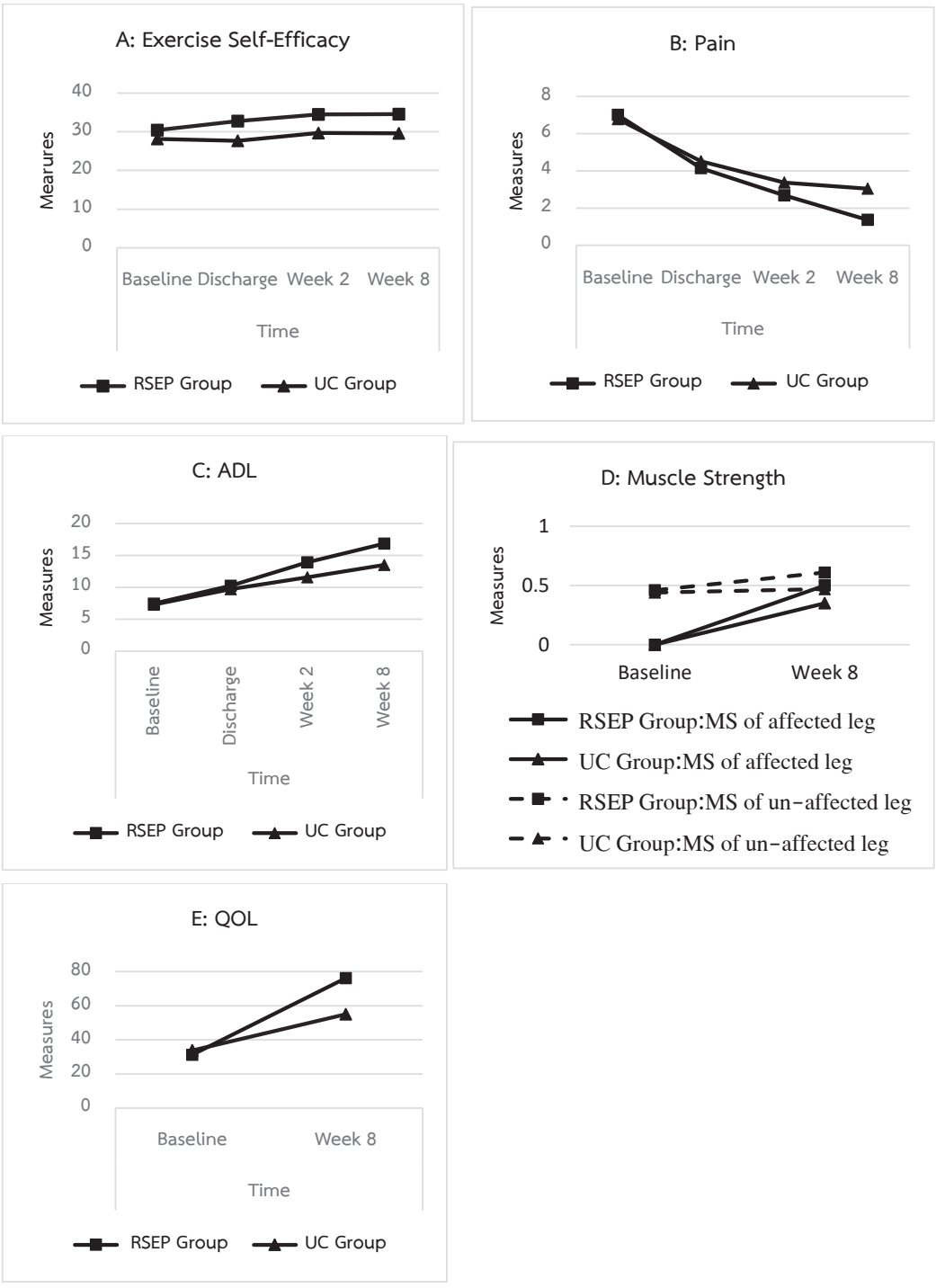

Figure 2. Descriptive analysis of exercise self-efficacy (A), pain (B), ADL (C), strength of muscle: MS (D), and quality of life (E). RSEP = Rehabilitation Self-Efficacy Program, UC = usual care

The beneficial impact of exercise self-efficacy was demonstrated by higher mean scores at discharge, two weeks, and eight weeks after discharge in the intervention group, which were significantly higher than those in the control group. At eight weeks after discharge, the mean pain score was significantly lower in the intervention group. Additionally, this group also had significantly higher ADL scores compared to the control group at both two weeks and eight weeks after hospital discharge.

These findings support the hypothesis, which stated that exercise self-efficacy, ADL, and pain in the intervention group significantly improved compared to the control group at all measured time points. Moreover, a large effect size (partial η^2 = 0.200, 0.185, and 0.255, respectively) showing the practical significance was found at eight weeks, as shown in **Table 2.**

The intervention group had higher mean scores for muscle strength in both the affected and unaffected legs at eight weeks (M = 0.50, SD = 0.16 and M = 0.61, SD = 0.18, respectively) than the control group (M = 0.35, SD = 0.13 and M = 0.47, SD = 0.17, respectively). Additionally, the intervention group (M = 76.17, SD = 15.08) demonstrated significantly higher mean QOL scores compared to the control group (M = 55.00, SD = 14.32). The findings support the hypothesis which stated that muscle strength of the affected leg and QOL were significantly higher in the intervention group than in the control group. In addition, large effect sizes (partial η^2 = 0.222 and 0.211, respectively) were demonstrated, as shown in **Table 3.**

Table 3. Muscle strength and quality of life between the intervention and control groups at week 8 (N = 55)

Source	SS	MS	F	p	η_p^2
Muscle strength of the affected leg (torque/kg)					
Group	0.16	0.16	15.08	< 0.001	0.222
Error	0.54	0.01			
Muscle strength of the unaffected leg (torque/kg)					
Group	0.18	0.18	4.94	0.030	0.085
Error	0.54	0.01			
Quality of life					
Group	2395.62	2395.62	14.17	< 0.001	0.211
Error	8962.65	169.11			

Note. η_p^2 = partial eta square/effect size

Discussion

This study showed the potential of the RSEP in improving the recovery of older adults with hip fractures. The program supports ongoing rehabilitation from admission through hospital discharge and significantly improves postoperative outcomes.

The findings of this study can be an important point of reference for developing postoperative outcomes programs based on self-efficacy theory.[13] The results align with the theoretical framework of the study, indicating that the four sources of self-efficacy can enhance confidence in performing consistent, appropriate behavior and exercises at home, leading to expected outcomes. In addition, these findings are consistent with a previous study investigating the effect of a self-care program that applied the self-efficacy theory, showing significantly higher self-efficacy regarding health behaviors in older adults undergoing hip surgery.[16] According to previous research, interventions aimed at enhancing self-efficacy can notably improve self-efficacy in rehabilitation and QOL for older adults recovering from hip fractures.[17]

This study involved monitoring the participants via telephone or the LINE application to continuously encourage and motivate older adults to exercise and walk with walking aids. A previous study showed that self-efficacy predicted exercise adherence to

rehabilitation in people after hip arthroplasty surgery.[15] Consequently, four sources of self-efficacy could increase self-efficacy rehabilitation and improve exercise adherence and functional ability in older adults undergoing total hip arthroplasty.[17]

There was a significant difference in the level of pain experienced by the control and intervention groups. The intervention group experienced lower levels of pain, which allowed them to rehabilitate better and perform independent activities. The study highlighted the importance of early rehabilitation and pain management in promoting early activities, assessing the participants' feelings, and encouraging them to build confidence in performing exercises and activities. Similarly, the study showed a significant negative association between pain and physical function in older adults[25,26] and a significant positive association between balanced self-efficacy and physical function.[25] Likewise, prior studies on ADL and pain reduction in older adults with a hip fracture at three months showed similar results to this study for those who received 8-12 weeks of rehabilitation, including ADL, instrumental activities of daily living (IADL),[6,27-29] as well as strengthening, balancing, and walking exercises.[28,30,31]

This study emphasized the importance of older adults with hip fractures engaging in continuous exercises, particularly quadriceps and gluteal exercises. The intervention group showed significantly better muscle strength and QOL than the control group. Exercise is essential for the recovery of older adults following hip surgery, as per the American College of Sports Medicine guidelines, which demonstrate that exercise enhances muscle strength and mass.[32] This is due to the activation of muscle cells, which consist of proteins such as actin and myosin, by their nerve cells during activities like exercise. This activation improves nerve-muscle interaction, leading to increased strength and power.[33] The recommended strengthening exercise regimen involves training each muscle group with 2-4 sets of 8-12 repetitions per set, completed more than twice a week.[32] The American Physical Therapy Association suggests that balance, gait, and strength training should be incorporated into the intervention program for rehabilitating older adults after hip surgery.[34] Moreover, a 16-week home-based physical therapy program focusing on strengthening and balance exercises led to improved muscle strength in older adults who had undergone hip fracture surgery.[10] Similarly, a rehabilitation program focusing on strengthening exercises following hip surgery significantly improved knee flexion strength after eight weeks of intervention.[11] A meta-analysis of ten trials in a progressive resistance exercise program supported our study by showing a significant increase in leg extension or knee muscle strength after hip surgery.[12]

In this study, it was found that there were significant improvements in pain, ADL, and muscle strength, which are all related to a better QOL. This finding is consistent with a previous study with 70 older adults undergoing total hip arthroplasty.[31] In this study, the intervention group received activity-related management after surgery, including early mobilization on the operative day, and showed a significant increase in QOL at three weeks and three months, compared to the control group, which received only standard care. Another study found that a 12-week home-based rehabilitation program for 42 older adults who underwent total hip arthroplasty significantly improved QOL at four weeks, 12 weeks, and six months.[30] In addition, QOL significantly improved in older adults who received a home exercise program for three months after hip arthroplasty.[35]

Limitations

The following limitations should be noted in this study. The participants only represented a certain range of older adults, including the young-old, middle-old, and old-old (aged 60-89 years), who were from a university hospital. Therefore, the generalization may be limited to other groups and settings. Further study should consider using the individual and family

management model as a conceptual framework for guiding the intervention.

Conclusions and Implications for Nursing Practice

The RSEP is beneficial. Remarkably, continuous monitoring and persuasion by integrating technology (telephone and LINE application), including confidence building and reinforcement, can help gradually improve exercise performance, even in the presence of barriers. Older adults with hip fractures have specific health training needs, including quadriceps and gluteal exercises, which can lead to positive health outcomes such as reduced pain, improved ADL, enhanced quadriceps muscle strength, and improved QOL. Therefore, nurses may consider implementing the RSEP for older individuals with hip fractures to promote recovery and health. However, to improve healthcare accessibility, further research should be conducted on various issues, such as the effect on older age and the intervention's long-term impact post-surgery.

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Appendix

Table A1. Implementation of the Rehabilitation Self-Efficacy Program (RSEP)

Time	Objective	Strategies/ Activities
Session 1 **Pre-surgery** (within 48 hours after admission) (Session 30 minutes)	To increase knowledge and self-efficacy for exercises, including pain management, lifestyle modification, and walking	**Strategies:** providing individual health information, demonstrating and return-demonstrating the exercises, concerning the participants' feelings, encouraging, and giving positive feedback 1. Provide verbal persuasion: 1.1 Provide health information and explain the benefits of appropriate behavior, especially focusing on the quadriceps and gluteal exercises 1.2 Encourage participation in exercises 2. Increase vicarious experience: 2.1 Show role models performing quadriceps and gluteal exercises, as well as walking, in a video animation and booklet; then provide participants with the booklet and video 3. Increase enactive mastery experience: 3.1 Inspire and empower individuals to engage in appropriate activities and exercise training until they gain confidence; Begin with exercises such as quadriceps static exercise and hip abduction exercise, focusing especially on the unaffected leg 4. Manage physiological and affective states: 4.1 Demonstrate, explain, and evaluate the quadriceps and gluteal exercise training 4.2 Promote positive emotion and encourage continued participation in exercises
Session 2 **Post-surgery** (postoperative within 24 hours) (The session lasts 15 minutes)	To increase self-confidence to perform exercises and pain management - Pain management: opioid, cold compression, postoperative position for keeping pain score less than or equal to 3 - Training exercise: quadriceps and gluteal exercises	**Strategies:** concerning the participants' feelings, reviewing pain management, demonstrating and return-demonstrating the exercises, encouraging, and giving positive feedback 1. Manage physiological and affective states: 1.1 Visit participants and assess their physical and mental condition with care; Allow them to ask questions and express their feelings. If they have pain, manage it by medication, cold compression, and proper position, to lessen the pain score to 3 or lower. 2. Increase enactive mastery experience and vicarious: experience 2.1 Demonstrate and explain the quadriceps and gluteal exercise

Table A1. Implementation of the Rehabilitation Self-Efficacy Program (RSEP) (Cont.)

Time	Objective	Strategies/ Activities
		2.2 Encourage participants to demonstrate the exercise until they feel confident in their capability 2.3 Add more training exercises in sitting and standing positions, such as straight leg raise exercises, leg extension exercises, bridging exercises (lifting only the unaffected leg), and standing hip abduction. Also, refer to the role model in the video animation and booklet. However, these exercises must not increase pain. 3. Provide verbal persuasion: 3.1 Encourage and motivate participants to adhere to exercise for six sets daily (10 times per set) 3.2 Give esteem to participants for their efforts 3.3 Evaluate participants' emotions and provide positive reinforcement
Session 3 **Discharge day** (1-2 days before discharge) (The session lasts 15 minutes)	To increase self-confidence to perform exercises, pain management, lifestyle modification, and walking with a walker	**Strategies:** demonstrating and return-demonstrating the exercises, reviewing lifestyle modification, encouraging, and giving positive feedback, concerning the participants' feeling 1. Increase enactive mastery experience and vicarious experience: 1.1 Encourage participants to perform exercises with confidence, train to walk with a walker, and watch role model demonstrations in video animations and booklets 2. To increase verbal persuasion: 2.1 Surveillance and review of appropriate behavior 2.2 Encourage and motivate participants to adhere to the workout exercise training six sets daily (10 times per set) 2.3 Ask for permission to call once a week and schedule face-to-face meetings in weeks 2 and 8, on the same days as doctor appointments 3. Manage physiological and affective states: 3.1 Commend participants for their efforts, acknowledge their feelings, and provide positive reinforcement
Session 4 **Home monitor weekly** via telephone or LINE application after hospital discharge for 8 weeks, and face to face meeting at week 2 and week 8 on the same day as doctor's appointment (The session lasts 5-15 minutes)	To increase self-confidence to perform exercises, lifestyle modification, and walking with a walker	**Strategies:** demonstrating and return-demonstrating the exercises, reviewing lifestyle modification, encouraging, and giving positive feedback, concerning the participants' feelings 1. Increase enactive mastery experience and vicarious experience: 1.1 Track improvements in exercise and walking 1.2 Encourage adherence to follow the role model in the video animation and booklet

Table A1. Implementation of the Rehabilitation Self-Efficacy Program (RSEP) (Cont.)

Time	Objective	Strategies/ Activities
		2. To increase verbal persuasion: 2.1 Encourage adherence to exercise for six sets daily (10 times per set) 2.2 Esteem for participants' efforts 3. To handle physiological and affective states: 3.1 Assess participants' feelings and inspire them to build more confidence

ประสิทธิผลของโปรแกรมส่งเสริมความสามารถแห่งตนในการฟื้นฟูสภาพต่อผลลัพธ์หลังผ่าตัดในผู้สูงอายุที่มีกระดูกข้อสะโพกหัก : การทดลองแบบสุ่มและมีกลุ่มควบคุม

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บทคัดย่อ: ผู้สูงอายุที่มีภาวะกระดูกสะโพกหักหลังได้รับการผ่าตัด ส่วนใหญ่จะสูญเสียความสามารถในการทำกิจกรรมต่าง ๆ และมีความต้องการการดูแลอย่างเนื่องเพื่อการฟื้นตัวหลังการผ่าตัด การวิจัยเชิงทดลองแบบสุ่มตัวอย่างเปรียบเทียบนี้ มีวัตถุประสงค์เพื่อศึกษาประสิทธิผลของโปรแกรมส่งเสริมความสามารถแห่งตนในการฟื้นฟูสภาพต่อผลลัพธ์หลังผ่าตัด ได้แก่ การรับรู้ความสามารถในการออกกำลังกาย ความปวด ความสามารถในการทำกิจวัตรประจำวัน ความแข็งแรงของกล้ามเนื้อ และคุณภาพชีวิต กลุ่มตัวอย่างจำนวน 58 คน ได้รับการสุ่มเข้ากลุ่มทดลองหรือกลุ่มควบคุม กลุ่มละเท่า ๆ กัน กลุ่มทดลองได้รับโปรแกรมส่งเสริมความสามารถแห่งตนในการฟื้นฟูสภาพเป็นเวลา 8 สัปดาห์ ในขณะที่กลุ่มควบคุมได้รับการดูแลตามปกติ การเก็บรวบรวมข้อมูลด้วยแบบสอบถามการรับรู้ความสามารถของตนเองในการออกกำลังกายบริหารกล้ามเนื้อต้นขาและสะโพก แบบประเมินระดับความรุนแรงของความปวด แบบประเมินกิจวัตรประจำวัน แบบสอบถามคุณภาพชีวิตผู้ที่มีข้อเข่า ข้อสะโพกเสื่อม และ เครื่องมือวัดความแข็งแรงของกล้ามเนื้อ วิเคราะห์ข้อมูลด้วยสถิติเชิงพรรณนา และสถิติวิเคราะห์ความแปรปรวนพหุคูณสองทางแบบวัดซ้ำ

ผลการศึกษาพบว่า กลุ่มทดลองมีการรับรู้ความสามารถในการออกกำลังกาย และความสามารถในการทำกิจวัตรประจำวันสูงกว่า แต่มีความปวดน้อยกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ ทั้งในระยะก่อนจำหน่าย สัปดาห์ที่ 2 และสัปดาห์ที่ 8 หลังจำหน่าย นอกจากนี้ ยังพบว่ากลุ่มทดลองมีความแข็งแรงของกล้ามเนื้อต้นขาและคุณภาพชีวิตสูงกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติในสัปดาห์ที่ 8 หลังจำหน่าย จากผลการศึกษาแสดงให้เห็นถึงประสิทธิผลของโปรแกรมฯ พยาบาลควรบูรณาการโปรแกรมนี้สู่การปฏิบัติเพื่อส่งเสริมคุณภาพการดูแลโดยรวมสำหรับผู้สูงอายุที่มีกระดูกสะโพกหัก อย่างไรก็ตาม ยังคงต้องการการศึกษาเพิ่มเติมในสถานที่ศึกษาต่าง ๆ ก่อนนำไปใช้อย่างกว้างขวาง

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คำสำคัญ: ความสามารถในการทำกิจวัตรประจำวัน การรับรู้ความสามารถในการออกกำลังกาย กระดูกข้อสะโพกหัก ความแข็งแรงของกล้ามเนื้อ ผู้สูงอายุ ความปวด คุณภาพชีวิต โปรแกรมการฟื้นฟูสภาพ

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