

การเปรียบเทียบวิธีการออกกำลังกายที่บ้านและการออกกำลังกายโดยมีนักกายภาพบำบัด  
เป็นผู้ให้คำแนะนำต่อการป้องกันภาวะแทรกซ้อนหลังการผ่าตัดในผู้ป่วยมะเร็งเต้านม  
A Randomized Comparison of Home-Based Exercise Versus Supervised Exercise  
for Preventing Postoperative Complications in Breast Cancer Mastectomy Patients

ช่อผกา ดำรงไทย<sup>1</sup> มัณฑนา วงศ์ศิริวรรัตน์<sup>1</sup> รุ่งทิภา วัจจละฐิติ<sup>1</sup> และวันเฉลิม นันทวิฑิตพงษ์<sup>2</sup>

Chorphaka Damrongthai<sup>1</sup>, Mantana Vongsirinavarat<sup>1</sup>, Roongtiwa Vachalathiti<sup>1</sup> and Wanchalerm Nunvittitpong<sup>2</sup>

### บทคัดย่อ

มะเร็งเต้านมเป็นมะเร็งที่พบบ่อยเป็นอันดับ 2 ในผู้หญิงไทยรองจากมะเร็งปากมดลูก และมีแนวโน้มที่จะเพิ่มสูงขึ้นเรื่อย ๆ การรักษาหลักคือการผ่าตัดร่วมกับการใช้รังสี และ/หรือการให้เคมีบำบัด การรักษาเหล่านี้มีผลข้างเคียงต่อสภาวะร่างกายและคุณภาพชีวิตของผู้ป่วยอย่างมาก ดังนั้น การฟื้นฟูด้วยโปรแกรมที่มีประสิทธิภาพทั้งในด้านการรักษา เวลาและค่าใช้จ่ายจึงมีความจำเป็นอย่างยิ่ง การศึกษานี้มีวัตถุประสงค์เพื่อเปรียบเทียบประสิทธิภาพของวิธีการออกกำลังกายที่บ้านและการออกกำลังกายโดยมีนักกายภาพบำบัดเป็นผู้ให้คำแนะนำต่อผลในการป้องกันภาวะแทรกซ้อนหลังการผ่าตัด อาสาสมัครเป็นผู้ป่วยหลังผ่าตัดเต้านมแล้วไม่เกิน 1 เดือน จำนวน 23 คน สุ่มให้อยู่ในกลุ่มออกกำลังกายที่บ้าน 11 คนและกลุ่มออกกำลังกายโดยมีนักกายภาพบำบัดเป็นผู้ให้คำแนะนำ 12 คน ตัวแปรที่วัดคือ องศาการเคลื่อนไหวของข้อไหล่ ระดับการบวมของแขน แรงแบบบีบมือ ระดับการทำงานของปอด ระดับการทำกิจกรรม ระดับคุณภาพชีวิตและระดับความพึงพอใจ ทำการวัดก่อนและหลังให้โปรแกรมออกกำลังกาย ในกลุ่มออกกำลังกายที่บ้าน ผู้ป่วยจะได้รับหนังสือการดูแลตนเองด้วยกายภาพบำบัดหลังผ่าตัดเต้านมพร้อมคำอธิบายจากนักกายภาพบำบัด โทรศัพท์ติดตามความก้าวหน้าของการออกกำลังกาย 3 ครั้งในสัปดาห์ที่ 5, 8 และ 12 ส่วนในกลุ่มออกกำลังกายโดยมีนักกายภาพบำบัดเป็นผู้ให้คำแนะนำ ผู้ป่วยพบนักกายภาพบำบัดเพื่อประเมินปัญหาและให้โปรแกรมออกกำลังกาย 3 ครั้งในสัปดาห์ที่ 3, 5 และ 12 ผลการศึกษาพบว่า ผู้ป่วยทั้งสองกลุ่มมีแนวโน้มของการฟื้นฟูสภาวะร่างกายหลังการผ่าตัดใกล้เคียงกัน ผู้ป่วยในกลุ่มออกกำลังกายโดยมีนักกายภาพบำบัดเป็นผู้ให้คำแนะนำมีแนวโน้มการเคลื่อนไหวไหล่ การทำงานของปอด ระดับการทำกิจกรรม และระดับคุณภาพชีวิตดีกว่าเล็กน้อย แต่ไม่พบความแตกต่างอย่างมีนัยสำคัญทางสถิติ อย่างไรก็ตาม ผู้ป่วยในกลุ่มนี้จะมีระดับความพึงพอใจมากกว่าอย่างมีนัยสำคัญทางสถิติ ( $p < .05$ ) ผลการศึกษาช่วยให้นักกายภาพบำบัดเลือกวิธีการฟื้นฟูแบบใดแบบหนึ่งได้ตามความเหมาะสมกับผู้ป่วยในแต่ละรายต่อไป

คำสำคัญ : การออกกำลังกาย วิธีออกกำลังกายที่บ้าน การฟื้นฟูหลังผ่าตัด มะเร็งเต้านม

<sup>1</sup> คณะกายภาพบำบัด มหาวิทยาลัยมหิดล ศาลายา จ. นครปฐม 73170

Faculty of Physical Therapy, Mahidol University, Salaya, Nakhon Pathom 73170

<sup>2</sup> สถาบันมะเร็งแห่งชาติ กรุงเทพฯ 10400

National Cancer Institute of Thailand, Bangkok 10400

## ABSTRACT

In Thai females, breast cancer is the second in prevalence after cervical cancer, and the number of new cases continued to rise. The side effects of main treatments those were surgery, radiotherapy and chemotherapy remained impact on physical condition and quality of life. Therefore, the effective rehabilitation program focus on the patients is still warranted.

The aim of this experimental study was to compare the effectiveness of two exercise programs, home-based exercise (HG) versus supervised exercise (SG), for preventing postoperative complications. The patients who underwent breast surgery within 1 month were recruited in this study. After randomization, there were 11 and 12 patients in HG and SG respectively. Shoulder range of motion, arm circumference, grip strength, lung function, functional activity, quality of life and satisfaction were measured before and after assigned the exercise program. The patients in HG received an exercise booklet and the explanation from the physical therapist. The exercise progression was monitored 3 times via telephone at 5, 8 and 12 weeks. For SG, the patients met the physical therapist 3 times for checking problems and assigning the exercise program at 3, 5 and 12 weeks.

The results showed that a recovery of the patients in HG seemed to be equal to SG. The patients in SG tended to have more improvement in shoulder range of motion, lung function, functional activity, quality of life and satisfaction, but no significant difference was observed excepted the satisfaction score ( $p < .05$ ). This study provided the guideline for the physical therapist to choose the appropriate rehabilitation program according to patient's condition.

**Keywords** : home-based exercise, supervised exercise, rehabilitation, mastectomy, breast cancer

E-mail : chorphaka@hotmail.com

## INTRODUCTION

Breast cancer remains the most common cancer that affects women all over the world (1). In Thai females, breast cancer is the second in prevalence after cervical cancer, and the number of new cases continued to rise during the past decade (2). To date, breast cancer treatment have been developed, but the side effects remained impact on physical condition and quality of life (3, 4).

Several studies reported complications in mastectomy patients. A systematic review by Rietman and co-workers in 2002 reported high variation in prevalence of pain from 12% to 51%, impairments in shoulder range of motion from 2% to 51%, lymphedema from 6% to 43%, decreased muscle strength from 17% to 33% and lung complication from 9% to 25% (3). In addition, there were reported significant decrease in activity of daily living and/or factors of health related quality of life (4).

Thus, there were many studies evaluated the effect of rehabilitation program for preventing problems mentioned above. For the studies which aimed to prevent postoperative complications, the patients usually received exercises under physical therapist supervision (5). In contrast, the studies

which aimed to improve general health were conducted as home-based exercise (6). At this point, there was no study compared between supervised exercise and home-based exercise in preventing postoperative complications. Therefore, this study determined the effect of home-based exercise used an exercise handout with one physical therapist instruction session compared with supervised exercise used several sessions of physical therapist visited.

## MATERIALS AND METHODS

### Subjects

The subjects of this study were the patients diagnosed one side breast cancer, and underwent breast surgery within 1 month at National Cancer Institute of Thailand. The patient was excluded if she had illness affected the function of upper extremities, received previous breast surgery or confused mental state.

### Instrumentation

1. Equipment: measurement tape, universal goniometer, grip strength dynamometer (T.K.K. 5001, Japan) and computerized spirometer (COSMED, INC., Italy).
2. Exercise instruction booklet.
3. Questionnaires: The functional activity questionnaire, the modified FACT-B questionnaire and the satisfaction questionnaire.

### Procedure

**Phase 1 Randomization:** after signing an informed consent, the patients were randomized into home-based exercise group (HG) or supervised exercise group (SG). Then, they were assessed all outcome variables including shoulder range of motion (ROM), arm circumference, grip strength, lung function, functional activity and quality of life (QOL) by a specifically trained physical therapist who was blinded to the group allocation of the subjects.

**Phase 2 Assigned exercise program:** the patients in HG received an exercise booklet with a session of instruction by the physical therapist. For SG, the patients were assigned and explained only the phase I of exercise, and also received the same exercise booklet as HG.

**Phase 3 Follow-up:** the patients in HG were monitored exercise progression and other problems via telephone at 5, 8 and 12 weeks. For SG, the patients were followed up at 3, 5 and 12 weeks for checking problems and assigning the progressive exercise program in phase II, III and IV according to their recovery.

In the last visit, the evaluator reassessed all outcomes and the program satisfaction.

## RESULTS AND DISCUSSION

## 1. Characteristics of subjects

There was no significant difference of any characteristic between groups as shown in Table 1.

**Table 1** Characteristics of subjects in HG and SG

Variables	HG (n = 11)	SG (n=12)
Age (years)*	48.82 ± 13.83	50.33 ± 10.41
BMI (kg/m <sup>2</sup> )*	25.14 ± 4.49	24.88 ± 4.35
Duration after surgery (week)*	3.18 ± 1.25	3.00 ± 1.35
Stages of cancer		
I	3 (27%)	3 (25%)
II	2 (18%)	3 (25%)
III	6 (55%)	6 (50%)
Surgical procedure		
Modified radical mastectomy	11 (100%)	12 (100%)
Wound infection	1 (9%)	1 (8%)
Previous shoulder problems	0	2 (17%)
Radiotherapy	2 (18%)	0
Chemotherapy	7 (64%)	10 (83%)
Hormone replacement therapy	1 (9%)	2 (17%)

\* Values are means ± SD

HG = Home-based exercise group, SG = Supervised exercise group

## 2. Shoulder Range of Motion (ROM)

At first visit, the patients in HG seemed to have better shoulder ROM because 3 patients in SG had some limitations of shoulder movement. However, 3 patients in HG had re-surgery and radiation during the study resulting in decreased shoulder ROM. Therefore, SG showed greater improvements of main motions at the final assessment similar to previous studies which compared supervised exercise and control (5). However, the values did not reach statistical significant difference as shown in Table 2.

## 3. Arm Circumference

The increase of arm circumference more than 2 cm indicates lymphedema. As shown in Table 3, none of the patient in both groups was observed arm edema. The small increase of arm circumference at 1<sup>st</sup> and 3<sup>rd</sup> level might be produced by the weight gaining which was the common side effects found in the patients who received chemotherapy as shown in Table 3.

**Table 2** Comparisons of shoulder ROM (degrees) between HG and SG at first visit and 3<sup>rd</sup> follow-up

Parameters	HG (n = 11)	SG (n=12)	p-value <sup>a</sup>
Shoulder flexion			
First visit	159.04 ± 18.56	157.58 ± 26.72	0.881
3 <sup>rd</sup> F/U	172.95 ± 15.28	173.46 ± 10.81	0.928
Shoulder extension			
First visit	64.00 ± 16.93	61.54 ± 21.19	0.763
3 <sup>rd</sup> F/U	60.47 ± 16.10	60.75 ± 13.68	0.965
Shoulder abduction			
First visit	152.13 ± 28.08	156.70 ± 26.23	0.691
3 <sup>rd</sup> F/U	169.77 ± 26.98	173.87 ± 16.44	0.661
Shoulder internal rotation			
First visit	81.64 ± 16.32	78.33 ± 18.62	0.657
3 <sup>rd</sup> F/U	94.54 ± 12.74	88.00 ± 8.50	0.159
Shoulder external rotation			
First visit	21.13 ± 9.74	24.54 ± 13.22	0.493
3 <sup>rd</sup> F/U	27.09 ± 18.93	29.58 ± 14.37	0.724

<sup>a</sup>Independent t test, Values are means ± SD, HG = Home-based exercise group, SG = Supervised exercise group

**Table 3** Comparisons of mean circumferential changed (cm) between HG and SG

Levels	HG (n = 11)	SG (n=12)	p-value <sup>a</sup>
1 <sup>st</sup> (MCP joints)	1.14 ± 1.22	1.33 ± 1.55	0.746
2 <sup>nd</sup> (Wrist joint)	0.20 ± 0.43	0.41 ± 0.63	0.373
3 <sup>rd</sup> (10 cm. below olecranon)	1.46 ± 1.64	1.05 ± 1.86	0.597
4 <sup>th</sup> (15 cm. above olecranon)	0.75 ± 1.37	0.17 ± 1.03	0.269

<sup>a</sup>Independent t test, Values are means ± SD, HG = Home-based exercise group, SG = Supervised exercise group

#### 4. Grip Strength

As shown in Table 4, no significant difference between groups was observed at first visit and 3<sup>rd</sup> follow-up. However, slight improvement of grip strength was found in HG while SG decreased. Contrast to Bendz et al in 2002, they found the patients who exercised with the supervisor improve in the grip strength at 6 months (7). Most of the patients in SG in this study received chemotherapy that caused malaise or fatigue. For this reason, they might not be able to exert maximal force during test.

**Table 4** Comparisons of grip strength (kg) between HG and SG at first visit and 3<sup>rd</sup> follow-up

Parameters	HG (n = 11)	SG (n=12)	p-value <sup>a</sup>
First visit	21.97 ± 4.93	23.39 ± 6.68	0.570
3 <sup>rd</sup> F/U	22.60 ± 4.25	21.75 ± 4.61	0.650

<sup>a</sup>Independent t test, Values are means ± SD, HG = Home-based exercise group, SG = Supervised exercise group

## 5. Lung Function

Pulmonary function test detected obstructive and restrictive lung conditions. The FEV<sub>1</sub>/FVC more than 75% are interpreted as no sign of pulmonary obstruction. As shown in Table 5, the patients in both groups had FEV<sub>1</sub>/FVC more than 80%. No statistically significant differences between groups were observed. Furthermore, the FVC was analyzed according to the patient's age and height for detecting pulmonary restriction. The results showed 4 patients in HG who received radiotherapy and wound debridement had restrictive defect at first and last visits while SG affected only 1 patient. However, the significant difference between groups did not reveal.

**Table 5** Comparison of FVC (L), FEV<sub>1</sub> (L) and FEV<sub>1</sub>/FVC (%) between HG and SG at first visit and 3<sup>rd</sup> follow-up

Parameters	HG (n = 11)	SG (n=12)	p-value <sup>a</sup>
FVC (L)			
First visit	2.01 ± 0.79	2.26 ± 0.54	0.382
3 <sup>rd</sup> F/U	2.29 ± 0.53	2.31 ± 0.42	0.936
FEV <sub>1</sub> (L)			
First visit	1.80 ± 0.68	2.01 ± 0.40	0.378
3 <sup>rd</sup> F/U	2.07 ± 0.45	2.02 ± 0.36	0.761
FEV <sub>1</sub> /FVC (%)			
First visit	90.63 ± 6.34	89.33 ± 7.20	0.651
3 <sup>rd</sup> F/U	90.18 ± 4.53	87.41 ± 6.40	0.249

<sup>a</sup>Independent t test, Values are means ± SD, HG = Home-based exercise group, SG = Supervised exercise group

## 6. Functional Activity

At the first visit 1 month after surgery, the patients in both groups showed some difficulties with 5 tasks in daily living i.e., zipping up a back fastening dress, closing a back fasten bra, washing the upper part of back on/opposite the surgery side and reaching overhead. However, it did not show significant difference between groups. At the final assessment, the patients in supervised exercise

group seemed to get more improvement of all the activities compared to the home-based exercise group. But the improvement did not reveal statistically significant difference between groups.

### 7. Quality of Life (QOL)

For this study, QOL was measured in 5 domains consisted of physical well-being, social well-being, emotional well-being, functional well-being and additional concerns. As summarized, the patients in SG tended to show better quality of life than HG, especially in emotional well-being and functional well-being. However, the statistical significant difference did not reveal in any domain.

### 8. Satisfaction

The patients in SG reported better satisfaction score than HG. There were statistically significant difference observed in 3 items i.e., group assignment ( $p = 0.045$ ), exercise prescription ( $p = 0.018$ ) and recovery status ( $p = 0.043$ ) as shown in Figures 1.

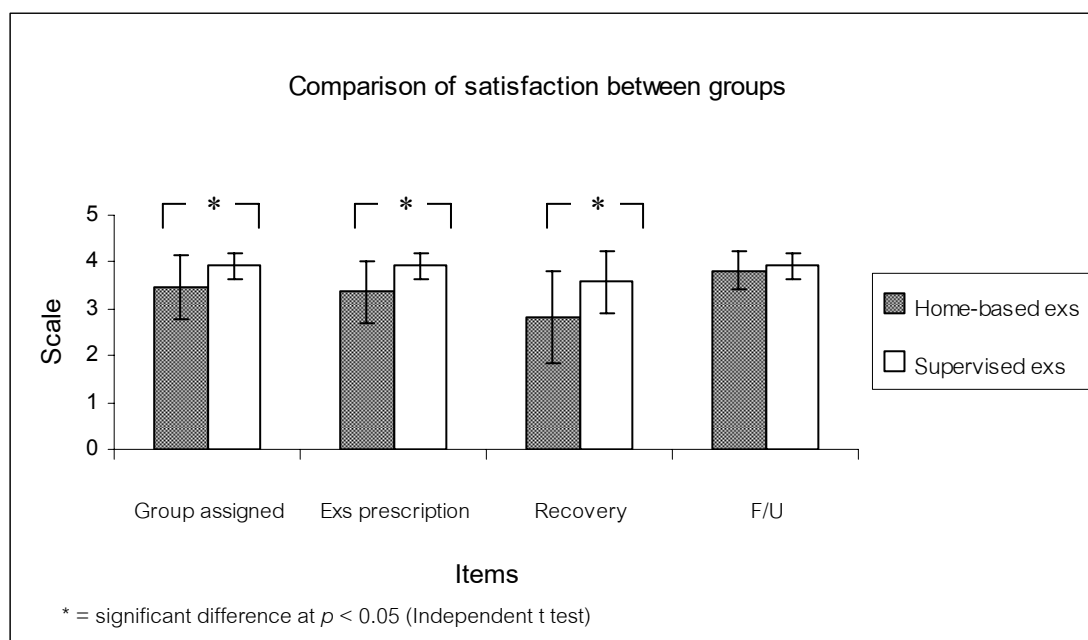


Figure 1 Comparisons of satisfaction between HG and SG at 3<sup>rd</sup> follow-up.

### 9. Exercise Compliance

The exercise compliance in both groups seemed to decrease since the 2<sup>nd</sup> visit. Most of patients complied in level B, and further decreased to level C at 3<sup>rd</sup> follow-up as shown in Table 6. It was apparent that the patients in SG had better exercise compliance than HG in the last two visits.

Table 6 Comparison of exercise compliance between HG and SG at 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> follow-up

Exercise compliance (Levels)	HG (n = 11)			SG (n=12)		
	A	B	C	A	B	C
1 <sup>st</sup> F/U	6 (55)	5 (45)	0 (0)	7(58)	5 (42)	0 (0)
2 <sup>nd</sup> F/U	3 (27)	5 (46)	3 (27)	4 (33)	6 (50)	2 (17)
3 <sup>rd</sup> F/U	2 (18)	4 (36)	5 (46)	4 (33)	4 (33)	4 (33)

Values are n (%), A = Always exercise, and followed the exercise prescription, B = Usually exercise, but did not follow the exercise prescription, C = Sometimes exercise, and did not follow the exercise prescription

## CONCLUSION

As the study results, there was no statistical significant difference between groups in any main outcome variable. However, the supervised exercise program was superior to home-based exercise in term of the patient satisfaction and exercise compliance. Therefore, it may conclude that home-based exercise is as effective as the supervised exercise in the prevention of postoperative complications. For the application, home-based exercise should be considered 2 issues for encouraging exercise compliance and satisfaction. First, the physical therapist should take more time for checking patients' understanding after assigning the exercise program. A simple questionnaire for evaluating their perceive might be beneficial. Second, to maximize the home program effectiveness, the therapist should arrange more times for monitoring exercise progression and on-call staff available for questions from some complicate cases.

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