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Effects of the Integrated Cardiac Rehabilitation (ICR) Program Applying to Post Ischemic Heart Disease Persons: A Pilot Study

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Abstract

Cardiac rehabilitation can prevent complication, reduce disease progression, and improve functional performance among post-ischemic heart disease patients. This pre-post quasi-experimental study was aimed to evaluate the effects of the integrated cardiac rehabilitation (ICR) program for Thai people. The 4-week ICR program was developed based on evidenced base practice for ischemic heart disease patients. The core components of the ICR program consisted of health coach, information about ischemic heart disease, illness management, risk reduction, self-management, and lifestyle modification. Thirty post- ischemic heart disease patients were recruited based on the inclusion criteria and participated in the ICR program 2 times a week; 2 sessions at OPD, 2 home visits, and phone calls. Data were collected by a package of questionnaires including demographic, health behaviors. Functional performance was measured by GraminViofit pedometer for walking steps. Data were analyzed by descriptive statistics and paired t-test. Results revealed that participants gained better health behaviors (risk behavior, physical activity/exercise, stress management, medical adherence, and self- management related to IHD at $p<.05$ level. The functional performance with step count evaluation was significantly improvement ($p<.001$).

From research results, the ICR program showed good effects for post-ischemic heart disease patients. Further research should implement as a randomized controlled trial, longitudinal study, and study in larger sample size.

Keywords: Ischemic heart disease; Integrated cardiac rehabilitation (ICR) program; Health behaviors; Functional performance

Abbreviations: CHD: Coronary Heart Disease; IHD: Ischemic Heart Disease; APN: Advanced Practice Nurse; ICR: Integrated Cardiac Rehabilitation; IRB: Institute Review Board; RA: Research Assistant; PI: Principal Investigator

Introduction

Coronary heart disease (CHD) or ischemic heart disease (IHD) has become a major burden of health care system worldwide and in Thailand. World Health Organization reported that it was the number one cause of death with the estimation of 17.9 million died globally in 2016 [1].

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The incidence of IHD has been increasing in Thailand and was reported 1140.31 per 100, 000 in 2015. The death rate was reported as a leading cause of death in 2010-2014 and it was 33.64 per 100,000 in 2018 [2]. The consequences of congestive heart failure, was also increasing with death rate to 26.91/100000. Males were found higher death rates 2-6 times greater than females in age over 50 years old [3].

Cardiac Rehabilitation was suggested to IHD patients to improve clinical outcomes, enhance quality of life, delay progression of IHD, and prevent re-hospitalization [4,5]. The CR program is divided into 4 phages; acute phase, sub-acute phase, intensive outpatient treatment phase, and independent ongoing conditioning phase [4]. The CR program aims to improve heart function by supervised exercise, reduce risk, prevent complication, and develop individual self- management. The main constructs of the effective cardiac program includes changing health behaviors such as eat low fat and calories, exercise regularly, quit cigarette and alcohol smoking, manage stress and anxiety, and develop self-management skills [6]. Furthermore, risk factors also included such as weight control, prevent and control high blood sugar, maintain normal blood pressure and blood lipid levels, and monitor early signs of complications and premature death [7]. The successful CR programs were found in many studies. For example, Seghers and colleages found persons with acute coronary syndrome who participated in 2-week CR program improving in physical activity and decrease in body mass index. Cohen et al. (2014) found changed in dietary, physical activity, and smoke secession [8]. A meta-analysis of 18 studies conducted by Halewijn et al. found good outcomes of CR program including reduce cardiovascular mortality, reduce the MI occurrence, less risk factors, incorporated prescription, blood pressure control, and significant reduce in LDL cholesterol [9].

Moreover, several studies provided information that success CR programs and their outcomes depend on many aspects such as program characteristics, patient characteristics and relevant factors such as heart function, illness perception, beliefs, attitudes, knowledge, social support, health care policy, and environment [8,10,11]. Some studies found that IHD persons was low rate of engagement in CR program and high rate of dropout because of lack of motivation, lack of knowledge about the disease, barriers to overcome behavior change, and mental health disorders such as high stress, anxiety, fear of repeating chest pain episodes and fear of death, and depression [11-13].

Since the rate of IHD among Thai people had been increasing and became a major health care burden [2], the Ministry of Public health Thailand set up cardiovascular excellence centers and "fast track system" to help IHD patients to get early access to effective treatment for oxygen reperfusion, reduces chest pain, and stop progression of IHD. This made IHD patients stayed short period in the hospitals, then IHD patients were discharged with brief health education related illness, lifestyle modification, and medication adherence. The full range of CR program might not implement to the patients and families, and then some issues might remain such as strategies for behavior modification and self – management, that might cause consequences such as complications, anxiety about health conditions, and scared about their heart function. In Thailand, CR program usually offers only in tertiary hospitals and cardiac centers in which available of cardiologists and CR team. Most of the CR programs concentrated on the first phase CR. From literature review, only a few studies of the CR program conducting for Thai people was found in tertiary hospitals; however, details and outcomes were not clearly identified [14,15]. There were evidences indicated about low attendance rate of IHD patients in CR programs [15,16]. Hence, it seemed that the later phases (phase 2,3,4) of CR programs which intend to change lifestyle, e.g. promote regular exercise, restrict sodium consumption, and develop effective self-management were more likely overlooked.

To develop the new CR program, Integrated Cardiac Rehabilitation (ICR) program, for IHD persons in Thailand, evidence based practice was conducted [17]. It was found that health coach was a prominent strategy to contribute good clinical outcomes for IHD persons. Health coach was found to be helpful to change behaviors, develop effective problem solving, and develop self-mangement [18-21]. Coach, who is an expert, provides sufficient information, guide client to set up reasonable goal and plan, support in the process, give feedback helping client to achieve the goal. For IHD persons, coach should be a person who expert in cardiovascular disease because the coach will understand about health and illness, CR specific goals, and provide support both information and emotion. In this ICR program study, the person who took action of coach was an Advanced Practice Nurse (APN) who expert in cardiovascular disease and understand the coach process. The coach help IHD persons to set up their goals, provide a collaborative process, track and evaluate progress, evaluating strengths and what is successful, as well as give positive feedback to helps the clients progress and move through. Furthermore, the new CR program also included self-selected walking ''or 'comfortable walking'' to the program because there was evidence suggested that its speed corresponds to individual functional capacities and

health status [21]. IHD patients might be well tolerated and practiced with individual pleasure, familiar, and easy to long-term engagement of lifestyle modification. To make a meaningful feedback, digital step count (GarminViofit) also backup for exercise tracking and training [22].

Therefore, the objective of this study would focus on evaluating the ICR which was incorporate health coach and core components from evidence based practice. The research results would benefit to IHD persons, families, and health care system.

Objectives

The objectives of this study were to develop and evaluate the efficacy of the new cardiac rehabilitation program for IHD patients in Thailand.

Research Methodology

This pilot study was a pre-post quasi-experiment design with double blind technique.

Sample

Sample was 30 post-ischemic heart disease persons who followed up at outpatient department of Queen Savangwattana Memorial Hospital at Sriracha, ChoBuri, Thailand. Inclusion criteria included 1) diagnosed as ischemic heart disease 2) No serious heart condition 3) able to do physical activity 4) able to communicate in Thai language. Exclusion criteria included 1) developed episode of chest pain 2) develop complication of congestive heart failure, and 3) could not participate in all activities. Data were collected from March 2016 through September 2016.

Intervention

Intervention included the Integrated Cardiac Rehabilitation (ICR) program and handbook for post IHD persons. The Integrated Cardiac Rehabilitation (ICR) program was developed based on evidence base practice. It was a 4-week program, implementing two times a week. The core structures of ICR program include health coach, illness information, behavior modification, and self-management. Handbook for post IHD persons was distributed to augment contents related to illness and management, lifestyle change, healthy food, and walk as daily exercise.

Measurements

Measurements to evaluate the ICR program developed by the researchers [23] included 1) demographic and health data including gender, age, marital status, career, education, incomes, illness history, and treatment, 2) Health behavior questionnaire asking about eating behavior, risk behavior, physical activity/exercise, stress management, medical adherence, and self- management related to IHD, and 3) GarminViofit pedometer (Gamin, USA) to count walking steps.

Quality of measurements

Quality of measurements was validated by experts for content validity with acceptable values (CVI > .80). Alpha Cronbach reliability was conducted with 30 post ischemic heart disease persons similar to sample with internal consistencies >.70. For ICR program, it was reviewed by 3 experts after developing; the revision was done before collecting data. GarminViofit pedometer was calibrated by the company and checked for accuracy prior implementation.

Human subjects' protection

The proposal was approved by the Institute Review Board (IRB) of Burpaha University, Thailand and Queen Savangwattana hospital, Thailand. The IRB protocols were adhered throughout the study.

Data collection procedures

As a double blind technique, two research assistant (RA) were prepared, the 1st graduate student assigning for implement the ICR program (RA-1) and another RA for measuring health data and outcomes (RA-2). Both RAs were informed and trained about the protocols by the principal investigator (PI) until they could work as assignments.

Data collection was conducted after IRBs approval. The PI met head of Outpatient department and relevant persons to inform them about the project and research procedures. Then, the PI and RA-2 approached prospective participant who followed up at OPD of Queen Savangwattana Memorial Hospital. Project objectives and details were presented to each participant and ask if he/she was willing to participate in the project. If potential participant agrees to participate in the program, the researcher would consult physician to confirm that participant condition might enroll in the ICR program. Then the RA-2 met eligible participant to inform about protection of human subject protocols, ask for signing inform consent form, and complete the package of questionnaire at a private area. Further, the PI made appointment with volunteers and introduce the RA-2 to participants for implementing the ICR program. The RA-2 met the volunteer individually 2 sessions at hospital for giving information about IHD, health management,

lifestyle change, 2 home visits for training exercise with GarminViofit pedometer and environment management, and 4 phone calls for counseling, foster, and support. Lastly, the RA-1 met participants on the next follow up asking them to complete the package of questionnaire on the 5th week and the 12th week.

Data analyses

Data were checked and entered in data bases. Descriptive statistics was used to analyses personal and health data. Pair t-test was used to analyze health behavior, functional status, and walking steps.

Results

The results revealed that majority of participants was male (63.3%), mean age 56.87 years old (SD = 10.21), married (83.3%). Forty percent were labors, live in their own house (67.7%), monthly incomes average 10,000 Baht (73.3%), diagnosed IHD less than 3 years (73.3%), average 28.7 months (SD = 28.30). They also reported that they experienced hospitalized admission (66.7%) and adhered to medical treatment (93.4%). Details as in table 1

Variable		N	Percent
Gender	Male	19	63.3
	Female	11	36.7
Age in years (M= 56.87, SD = 10.21)	< 50	6	20.0
	50 - 59	13	43.3
	60 - 69	7	23.4
	≥ 70	4	13.3
Marital status	Married	25	83.3
	Single/Devoice/Separate	5	16.7
Occupation	Labor	12	40.0
	Officer	6	20.0
	commercial	4	13.3
	Others	8	26.7
Monthly income (Baht)	≤ 5,000	3	10
	5,001-10000	2	6.7
	10,001-15,000	9	30.0
	> 15,000	13	43.3
	Not respond	3	10
Duration of IHD			
(M= 28.7 month , SD = 28.3)	< 1 year	7	23.3
	1 - 3 years	15	50
	4 - 6 years	4	13.3
	> 6 years	2	6.7
	Not respond	2	6.7
Rehospitalization	Non	3	10
	1 time	20	66.7
	2 times	5	16.7
	3 times	2	6.7
Adhere to medical treatment /FU	Adhere	28	93.4
	Non-adhere /	1	3.3
	Not respond	1	3.3

Table 1: descriptive of personal characteristics.

The results also revealed that participants produced better outcomes after participating in the ICR program. The paired t-test showed statistically significant on eating behavior (t_{29} = 2.17, p = .03), physical activity/exercise (t_{26} = 8.80, p < .001), stress management (t_{29} = 3.54, p = .001), self-management (t_{23} = 2.46, p = .02), and medical adherence and risk control (t_{29} = 13.12, p < .001). However, alcohol drinking was not significant difference after participate in the IRC program. Details can be seen in Table 2.

Variable	Mean	SD	D	T	df	p
Dietary behavior						
Before	43.37	7.78	3.83	2.17	29	.03
After	47.2	5.67				
Physical activity/exercise						
Before	14.41	3.51	6.78	8.80	26	<.001
After	21.19	2.64				
Stress management						
Before	31.20	2.72	2.67	3.54	29	.001
After	33.87	3.90				
Medication and risk control						
Before	32.07	3.53	14.10	13.12	29	<.001
After	46.17	4.07				
Alcohol drinking /smoking						
Before	7.66	3.74	-1.07	-1.33	26	.19
After	6.59	2.66				
Self-management						
Before	7.71	1.55	1.04	2.46	23	.02
After	8.75	2.02				

Table 2: Comparison of lifestyle behaviors before and after participates in the IRC program.

Furthermore, the results found that IHD persons improved in their functional performance as significantly increasing step counts (t_{17} =5.02, p<.001). Details were in Table 3.

Variable	Mean	SD	D	T	df	p
Steps (7 day interval)						
Before	33295.94	9109.5	7164.61	5.02	17	<.001
After	40460.56	8579.4				

Table 3: Comparison of Functional performance before and after participate in the IRC program.

Discussion

The results showed that the ICR program improved their health behaviors, risk control, functional performance, and walking steps in IHD persons. As the main points of ICR program, the success might influence by coaching nurse, home-based lifestyle modification, problem solving and walking coach. The nurse who coach was proficiency in cardiovascular disease provided information to participants one by one and individually consult as participant concerns. The coach would help them to better understand about pathophysiology and how to improve of their remained functions. All information as IHD persons need might help them to better understand about their illness, health conditions, how to manage them after recovery from ischemic heart disease. Sufficient Information about food, sodium restriction, and low caloric diet might help participants to manage the big burden of changing dietary consumption because Thai food is more likely homemade without standard menus and meals providing to family members together. Participants or family member had to learn new technique to select and cook a specific food for IHD persons, while IHD persons had to adapt and learn to skip or ignore their previous favorite food.

Further, walking was easy, familiar, and could do at any time any place, and no extra preparation. Then, training walking might be easy to them to regain active because they were confirmed that they could start over exercise, monitored, and steadily increase step counts by the GarminViofit. They can stop and start over if they tired during exercise training. The accumulation of steps at the end of the day would tell them about their performances. If they faced about their practices, the coaching nurse would help them to find out a solution. Moreover, home visits and phone calls might benefit for information support, solving problem, encourage, and emotional support when they were at homes. Phone calls might complement to participants for overcame barriers and adjust their lifestyle, especially daily food consumption and exercise.

The results were supported by many studies such as Sangster et al. [22] found the outcomes of the individual

health-coach program such as weight control, lifestyle change focusing in dietary and exercise. Cohen et al. [24] also found after participated in CR program, sample changed in dietary and physical activities as well as quit smoke. Helewijn et al. [9] found the 18 CR programs contributed good outcomes to reduce cardiovascular mortality, lower risk factors, medication incorporation, blood pressure control, and lower LDL cholesterol.

In conclusion, the ICR incorporated information related to illness, medical and treatment, self- management, healthy lifestyle, and health coach technique could influence participants' knowledge, believe, and lifestyle behaviors. It contributed good outcomes; therefore clinical practice might be implemented. Controlled trial for further research might be needed.

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