Original Articles/นิพนธ์ต้นฉบับ

Measurement of Physical Activity of Patients Undergoing Post-operative Open Heart Surgery at Ramathibodi Hospital.

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Abstract

Objectives: To measure the level of physical activity and factors affecting physical activity of patients who underwent post-operative open heart surgery at Ramathibodi Hospital.

Study Design: Descriptive cross-sectional study

Setting: Division of Cardiac Rehabilitation, Department of Physical Medicine and Rehabilitation, Faculty of Medicine, Ramathibodi Hospital, Mahidol University.

Subject: Post-operative open heart surgery patients who attended and followed up cardiac rehabilitation program at Division of Cardiac Rehabilitation, Department of Physical Medicine and Rehabilitation, Ramathibodi Hospital between January 1995 - March 2007

Method: Physical activity was measured by using the Thai short IPAQ and classified as highly active, moderately active and inactive. Subjects answered the questions about their activities during the last 7 days.

Results: There were 46 male and 21 female patients, age of 25-86 years, with one to eleven years in duration post open-heart surgery. Fifteen patients (22.4%) were highly active, 23 patients (34.3%) moderately active and 29 (43.3%) patients inactive in physical activity.

Conclusion: About 57% patients with post open-heart operation and cardiac rehabilitation at Ramathibodi Hospital had moderately active to highly active physical activity and the factor affecting physical activity was risk stratification.

Key words: physical activity, post open-heart surgery, cardiac rehabilitation

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Recent update in cardiothoracic surgery in Thailand reveals that open-heart surgery has become an alternative for cardiac patients. During post-operative period, the patient would be referred to Division of Cardiac Rehabilitation, Department of Physical Medicine and Rehabilitation for proper physical program that would decrease recurrence of cardiovascular ischemia. Each patient would be advised for post-operative rehabilitation program (education, counseling, behavioral modification and individual exercise program).

Incidence of recurrent cardiovascular ischemia in post-operative open-heart surgery is quite high and recent studies have shown that appropriate physical activity and intensity can prevent and decrease incidence of recurrent cardiovascular ischemia[2]. Recommendation is moderate intensity, at least 30 minutes/day and 5 days/week or hard intensity, at least 20 minutes/day and 3 days/week[3]. Additional study rendered support that routine daily physical activity, e.g., housework, gardening and proper hobby gives better physical fitness and health benefit. There has been a lot of continual supports to promote exercise in Thailand.

In 2006, Agingthai, Department of Medical Services, Ministry of Public Health, Thailand released a guideline to make available physical activity for elderly people with heart disease[4] to promote health, safety and free from their disease.

The most popular way to measure physical activity is questionnaire due to convenience and no need for special technique. One of the most accepted questionnaires is International Physical Activity Questionnaire (IPAQ) that was originally used in adult population aged 18 -65 years. In 2006, Kolbe-Alexander et al. tested IPAQ in measuring physical activity in South African older adults (validity = 0.79 and reliability = 0.85)[5]. However, so far, there is no study of IPAQ in measuring physical activity of patients who underwent post-operative open-heart surgery. Craig et al. reported validity and reliability of IPAQ in 12 countries[6] and it was translated in many languages. In 2005, Rattanawiwatpong et al. translated IPAQ into Thai language and tested validity and reliability[7]. In cardiac-rehabilitation clinic, Ramathibodi Hospital, researchers found that most of the patients who underwent post-operative open heart surgery more than 1 year could not maintain their physical activity level. This result agreed with previous report that 50% of patients who underwent post-operative open-heart surgery for more than 1 year could not maintain their physical activity level. The purpose of this study was to measure and identify factors that might affect physical activity level of patients who underwent post-operative open heart surgery at Ramathibodi Hospital.

Methods

Study design: Descriptive cross-sectional study

Place: Cardiac-rehabilitation Division, Department of Physical Medicine and Rehabilitation, Faculty of Medicine, Ramathibodi Hospital, Mahidol University

Study population:

Inclusion criteria:

1. Patients who underwent post-operative open-heart surgery for more than 1 year and received cardiac-rehabilitation program at Ramathibodi Hospital
2. Patients agreed to sign informed consent

Exclusion criteria:

1. Patients who did not agree to sign informed consent
2. Patients who had abnormal cognitive function
3. Patients who had communication problems
4. Patients who had disabilities or illnesses, e.g., stroke, chronic kidney disease, limb amputation

Research instrument

Thai version of short format International Physical Activity Questionnaire (Thai short IPAQ)

Research methodology

1. Investigator reviewed hospital record of patients who underwent post-operative open-heart surgery for more than 1 year and received cardiac-rehabilitation program at Ramathibodi Hospital.
2. Investigator explained study purpose and requested for informed consent
3. Study team member recorded baseline data including age, sex, occupation, demographic data, date and type of surgery
4. Recorded weight and height (to calculate body mass index)
5. Reviewed medical record about cholesterol level and identified risk stratification of exercise
6. Interviewed patients with Thai short IPAQ (in appendix)
7. Patients did SF-36 and HADS questionnaire to compare with pre-operative data
8. Analysis and interpretation of results

Data analysis

Baseline characteristics, body mass index (BMI), cholesterol blood level, risk stratification of exercise, result from SF-36 and HADS to calculate for mean and percentage to compare between 1 year pre-operative and 1 year post-operative data by Chi-square test. All data were computerized and analyzed by SPSS (version 12), with significant value at $p \leq 0.05$

Results

During 1995 - 2007, a total number of patients who underwent post-operative open-heart surgery were 1431 cases, death 104 cases and recruited in this study 67 cases (as shown in Table 1). Baseline characters were male 46 cases (68.7%), female 21 cases (31.3%) with age average 65.82 years, duration

Table 1. Baseline demographic data

	Patient (n = 67)	Mean (SD)
Gender		
- Male (%)	46 cases (68.7)	-
- Female (%)	21 cases (31.3)	-
Age (year)	25-86	65.82 (9.43)
BMI (kg/m^2)	18.75-34.63	25.15 (3.38)
Occupation		
- Yes (%)	19 (28.4)	-
- No (%)	48 (71.6)	-
Domicile		
- Bangkok (%)	40 (59.7)	-
- Outside Bangkok (%)	27 (40.3)	-
Risk stratification of exercise		
- Low (%)	53 (79.1)	-
- Intermediate (%)	9 (13.4)	-
- High (%)	5 (7.5)	-
Type of cardiac operation		
- CABG (%)	59 (88.1)	-
- Valve replacement (%)	7 (10.4)	-
- Other (%)	1 (1.5)	-

of post-operative heart surgery of 1 -11 years, and average body mass index (BMI) of 25.15 (3.38) Kg/m2. 19 cases (28.4%) were employed but 48 cases (71,6%) were not. Most of the patients lived in Bangkok (40 cases (49.7%) with 24 cases (40.3%)). In term of risk stratification of exercise, classified as low risk 53 cases (79.1%), moderate risk 9 cases (13.4%) high risk 5 cases (7.5%) and CABG 59 cases (88.1%), valve replacement 7 cases (10.4%) and other 1 case (1.5%) as in Table 1.

Physical activity was measured by using the Thai short IPAQ and classified as highly active 15 cases (22.4%), moderately active 23 cases (34.3%) and inactive 29 cases (43.3%) as in Table 2.

Post-operative physical and mental score were significant increased when compared with pre-operative score $p < 0.00$ (69.82 (17.35), 76.47 (17.57) and 31.5 (27.20), 39.68 (30.33)). HADS score above 11 (indicate abnormal) in preoperative anxiety 8 cases and resolve after post-operative period and in preoperative depression 5 cases and only 1 case after post-operative period. Cholesterol level was measured in 57 cases and was significant increased ($p = 0.005$) at post-operation (pre operation cholesterol level 46.77 (6.19) and post operation cholesterol level 47.96 (6.35) as in Table 3.

Post operative SF-36 and cholesterol level classified by level of physical activity were increased for physical (highly 52.2, moderately 35.18 and inactive 33.30), mental (highly 52.2, moderately 35.18 and inactive 33.30) and cholesterol different level (highly 17.91, moderately 4.38 and inactive -3.5) but no statistical significance difference compared with pre-operative as in Table 4.

In Table 5, the relation between baseline demographic data classified as physical activity and included

Table 2. Classification of physical activity

Physical activity	N	%
- Highly active	15	22.4
- Moderately active	23	34.3
- Inactive	29	43.3

Table 3. SF-36, HADS and cholesterol level between pre and post operation

	Pre operation Mean (SD)	Post operation Mean (SD)	p-value
SF-36			
- Physical	31.5 (27.20)	69.82 (17.35)	0.00 *
- Mental	39.68 (30.33)	76.47 (17.57)	0.00 *
HADS			
- Anxiety (> 11 indicated abnormal)	8 คน	0 คน	-
- Depression (> 11 indicated abnormal)	5 คน	1 คน	-
Cholesterol level (n = 57)	46.77 (6.19)	47.96 (6.35)	0.005 *

Table 4. Post operative SF-36 and cholesterol level classified by level of physical activity

Physical activity	Highly active	Moderately active	Inactive	p value
SF-36				
- Physical	52.2 (±32.58)	35.18 (±26.81)	33.30 (±30.68)	0.126
- Mental	52.45 (±34.54)	27.85 (±28.01)	35.72 (±33.70)	0.078
Cholesterol (Difference)	17.91 (±54.89)	4.38 (±43.69)	-3.5 (±53.36)	0.533

Table 5. Baseline demographic data classified as physical activity

Physical activity / Baseline character	Highly active	Moderately active	Inactive	p-value
Age				
- less than 40 years old	0	0	1	0.655
- 40 - 60 years old	3	6	4	
- above 60 years old	12	17	24	
Gender				
- male	12	17	17	0.279
- female	3	6	12	
Occupation				
- Yes	5	5	9	0.677
- No	10	18	20	
Domicile				
- Bangkok	6	16	18	0.181
- not in Bangkok	9	7	11	
Risk stratification of exercise				
- low	9	20	24	0.038 *
- intermediate	2	3	4	
- high	4	0	1	
BMI (kg/m_2)				
- 18.5 - 22.9 (normal)	3	7	7	0.094
- 23 - 24.9 (overweight)	2	10	6	
- ≥ 25 (obesity)	10	6	16	
Type of cardiac operation				
- CABG	14	21	24	0.724
- Valve replacement	1	2	4	
- Other	0	0	1	

age, gender, occupation, domicile, BMI and type of cardiac operation did not have effect on physical activity except risk stratification of exercise (p = 0.038)

Discussion

The result of patients who underwent post-operative open-heart surgery at Ramathibodi Hospital shows mean age 65.82 years. About 57% patients had moderately active to highly active physical activity and the factor affecting physical activity was risk stratification.

From literature review, Panagiotakos DB et al, reported in similar direction. Panagiotakos evaluated physical activity by IPAQ questionnaire in elderly group (65 -100 years, 55% male and 45% female) who had moderately active to highly active physical activity[8]. This result was similar to that of the previous study in 2005 which showed that physical activity of Ramathibodi staff, aged 45 - 60 years had moderately active to highly active physical activity 58.61%[9]. From this study it was demonstrated that patients who underwent post-operative open-heart surgery at Ramathibodi Hospital were in acceptable range and closed to normal population with similar age and the most important impact factor was “Risk stratification of exercise” The possible causes were that most of participants had only low risk.

In many publications, age was a reverse relationship with level of active physical activity (elderly will increase inactive); however this finding has never achieved statistical significance because of in adequate number of participants.

Post-operative physical and mental scores as measured by SF-36 were significantly increased compared with pre-operative score that was similar to previous studies. Falcoz[10] et al reported almost 50% improvement in post-operative score by SF-36 than the pre-operative score.

Cholesterol and HDL level were collected as indicators of physical activity level in patient. Kokkonos[11] et al reported that adequate physical activity increased HDL-c level that decreases prevalence of ischemic heart disease. However in this study, the limitation of HDL-level in hospital record, investigator cannot calculate this relationship. This limitation included the test that was not done in some patients, patient did blood test in the other hospitals etc.

According to the review literatures, no article uses IPAQ questionnaire to measure physical activity in cardiac patients. The usual questionnaire is Human Activity Profile (HAQ) but it is more difficult and more time consuming than IPAQ[12].

IPAQ questionnaire is a simple method to measure physical activity. However, the mistake may happen, e.g., not understand question(s), especially in elderly. To minimize this error, the design of study should plan to interview IPAQ questionnaire by study team (physician and nurse in cardiac rehabilitation) and two well-trained interviewer assistants. Another possible mistake is to complete IPAQ questionnaire, e.g., inter-rater reliability, patient’s memory to recall event that happened 7 days ago[13,14].

Conclusion

56.7% patients with post open-heart operation and cardiac rehabilitation at Ramathibodi Hospital for at least 1 year had moderately active to highly active physical activity and the only factor affecting physical activity was risk stratification.

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References

1. Williams MA, Ades PA, Hamm LF, Keteyan SJ et al. Clinical evidence for a health benefit from cardiac rehabilitation: An update. Am Heart J 2006;152:835-41.
2. Chaiwanichsiri D. Physical Activity Role of Prevention. In : Kantaratanakul V, Kunjara-na-Agudhya R, editors. Cardiac Rehabilitation. Nonthaburi: Apisara International Group Limited; 2005: p 87-101.
3. Nelson M, Rejeski WJ, Blair SN, Duncan PW et al. Physical Activity and Public Health in Older Adults: Recommendation from the American College of Sports Medicine and the American Heart Association. Med Sci Sports Exerc 2007;39:1435-45.
4. Department of Public Health Medicine. Clinical Practice Guidelines on Physical Activity for Elderly People with Heart Disease, September 2006.
5. Kolbe-Alexander TL, Lambert EV, Harkins JB et al. Comparison of two methods of measuring Physical Activity in South African Older Adults. J Aging Phys Act 2006;14:98-114.
6. Craig CL, Marshall AL, Sjostrom M, Bauman AE, Booth ML, Ainsworth BE, et al. International Physical Activity Questionnaire: 12-Country Reliability and Validity. Med Sci Sports Exerc 2003;35:1381-95.
7. Rattanawiwatpong P, Khunphasee A, Pongurgsorn C and Intarakamhang P. Validity and Reliability of the Thai Version of Short Format International Physical Activity Questionnaire (IPAQ). RTA Med J 2548;58:289-300.
8. Panagiotakos DB, Polystipioti A, Polychronopoulos E. Prevalence of type 2 diabetes and physical activity status in elderly men and women from Cyprus (the MEDIS Study). (Cited 2008 October 19). Available from: URL:http://www.pubmed.com.
9. Falcoz PE, Chocron S, Stoica L, Kaili D, Puyraveau M, Mercier M et al. Open Heart Surgery: One-year self-assessment of quality of life and functional outcome. Ann Thorac Surg 2003;76:1598-604.
10. Kokkinos P. Physical activity and cardiovascular disease prevention: current recommendation. Angiology 2008;59(Suppl):26S-9S.
11. Warms C. Physical activity measurement in persons with chronic and disabling conditions: methods, strategies, and issues. Fam Community Health 2006;29:78s-88s.
12. Vanhees et al. How to assess physical activity? How to assess physical fitness? European Journal of Cardiovascular Prevention and Rehabilitation 2005;12:102-14.
13. Laosupap K, Sota C, Laopaiboon M. Factor affecting physical activity of rural Thai midlife women. J Med Assoc Thai 2008;91:1269-75.