ORIGINAL ARTICLE

Adherence in Following Phase II Cardiac Rehabilitation Program among Patients with Coronary Artery Disease Post-Revascularization

Arnengsih Nazir[1], Badai Bhatara Tiksnadi[2], Fahreza Pradana[3]

[1] Department of Physical and Rehabilitation Medicine, Dr. Hasan Sadikin General Hospital/Faculty of Medicine Universitas Padjadjaran, Bandung, Indonesia,

[2] Department of Cardiology and Vascular Medicine, Dr. Hasan Sadikin General Hospital/Faculty of Medicine Universitas Padjadjaran, Bandung, Indonesia,

[3] Faculty of Medicine Universitas Padjadjaran, Bandung, Indonesia

ABSTRACT

Purpose: This study aimed to describe the adherence of patients with coronary artery disease (CAD) in initiating, sustaining, and completing phase II cardiac rehabilitation (CR) program after revascularization with Coronary Artery Bypass Graft (CABG) and Percutaneous Coronary Intervention (PCI).

Methods: This study was conducted using a descriptive cross-sectional design and secondary data were taken retrospectively from medical records. The population was post-revascularization CAD patients undergoing phase II CR at Dr. Hasan Sadikin General Hospital from 2019-2020 and all samples were selected using the total sampling method. Adherence was defined as the ability to initiate, sustain, and complete CR program in the CABG and PCI groups, and it was expressed in percentage.

Results: A total of 96 subjects were found to meet the inclusion and exclusion criteria. The adherence for initiating the CR program was 94.6% and 100% in the CABG and PCI groups respectively. A total of 50 (67.56%) and 16 people (72.72%) in the respective groups completed each training session on time as programmed. About 57 (77.02%) and 16 people (72.72%) in each group respectively completed 12 training sessions regardless of the specified time.

Conclusion: Overall, the level of adherence to following phase II CR in the CABG and PCI groups was relatively high. Adherence to initiating and sustaining phase II CR in the PCI was higher than in the CABG group.

Keywords: adherence, cardiac rehabilitation, Coronary Artery Bypass Graft, Percutaneous Coronary Intervention

ABSTRAK

Pendahuluan: Penelitian ini bertujuan untuk menggambarkan kepatuhan pasien dengan penyakit arteri koroner (PAK) setelah revaskularisasi dengan bedah pintas arteri koroner (BPAK) dan intervensi koroner perkutan (IKP) dalam memulai, menjalani, dan menyelesaikan program rehabilitasi jantung (RJ) fase II.

Metode: Penelitian ini bersifat deskriptif dengan desain potong lintang. Data sekunder retrospektif diambil dari rekam medis. Populasi penelitian ini adalah pasien PAK yang menjalani revaskularisasi dan mengikuti RJ fase II di Rumah Sakit Umum Dr. Hasan Sadikin pada tahun 2019-2020. Pengumpulan sampel dilakukan dengan metode sampling total. Kepatuhan digambarkan sebagai kepatuhan memulai, menjalani, dan menuntaskan program RJ pada kelompok BPAK dan IKP serta dijabarkan dalam persentase.

Hasil: Sembilan puluh enam subjek memenuhi kriteria inklusi dan eksklusi. Kepatuhan memulai program RJ setinggi 94,6% pada kelompok BPAK dan 100% pada kelompok IKP. Lima puluh subjek (67,56%) pada kelompok BPAK dan enam belas (72,72%) pada kelompok IKP menjalani sesi latihan sebagaimana terjadwal. Sebanyak 57 subjek (77,02%) pada kelompok BPAK dan 16 subjek (72,72%) dari kelompok IKP menyelesaikan 12 sesi latihan, tanpa memandang waktu yang diperlukan untuk menuntaskannya.

Simpulan: Secara keseluruhan, kepatuhan mengikuti program RJ fase II pada kelompok BPAK dan IKP cukup tinggi. Kepatuhan untuk memulai dan menjalani program RJ fase II pada kelompok IKP lebih tinggi dari kelompok BPAK.

Kata kunci: bedah pintas arteri koroner, intervensi koroner perkutan, kepatuhan, rehabilitasi jantung.

Correspondent Detail:

Arnengsih Nazir

Department of Physical and Rehabilitation Medicine, Faculty of Medicine Universitas Padjadjaran, Dr. Hasan Sadikin General Hospital, Bandung, Indonesia
Email: arnengsih@unpad.ac.id

INTRODUCTION

Heart disease is one of the major health problems worldwide, including in Indonesia. According to the Basic Health Research data (Riskesdas) in 2018, the prevalence of heart disease based on the diagnosis of the physician among all ages in all provinces was 1.5% of the 1 million population.[1] The most common cause of death from heart disease is coronary artery disease (CAD). Indonesian Sample Registration System (SRS) survey in 2014 showed that CAD is the second-leading cause of death among all ages after stroke, accounting for 12.9%.[2]

The medical assessment of CAD patients is generally implemented by pharmacologic therapy either with or without surgery. The most common non-surgical procedure is Percutaneous Coronary Intervention (PCI) and the surgical option is Coronary Artery Bypass Graft (CABG). After a successful medical intervention, patients usually undergo a cardiac rehabilitation program (CR) to restore their functional abilities and gradually return to normal daily activities.[3]

CR program is well-organized and consists of several core components such as prescribing physical exercises, controlling risk, and managing psychosocial factors. It is a secondary prevention program and aims to prevent the deterioration of disease or recurrence.[4-6] This program consists of 3 phases, namely 1 (inpatient), 2 (outpatient), and 3 (community).[5-8] A study reported that participation in CR could support a healthy lifestyle, alleviate risk factors, improve quality of life, and reduce the mortality rate.[9-10]

Supporting patients to modify their lifestyle by controlling risk factors and providing appropriate exercise prescriptions can mitigate the disease.[11] Pouche et al. found that completion of CR program reduced both mortality and hospital admission rate. Furthermore, identifying and controlling individualized risk factors can be more effective in planning interventions for each CAD patient.[12] Other studies suggested that CR was associated with a 20-30% reduction in cardiac hospitalization and a 26% decline in cardiac mortality. Pack et al. also reported that participation in CR was associated with a 45% reduction in all-cause mortality.[14] Sjolin et al. showed that patients attending CR had mitigated cardiovascular risk factors, including rates of smoking cessation and improvement in physical activity, as well as a greater reduction in triglyceride levels, body weight, and cholesterol levels.[15]

Although the benefits of CR are widely known, several factors have become concerned barriers to implementing the program. These common barriers include low referral rates, limited transportation, tight schedule, aversion to group therapy, economic conditions, and lack of insight.[13] Another significant factor is the adherence of patients in undergoing phase II CR. Patients' adherence is a crucial condition that can be amplified to improve cooperation. Implementing CR program in hospitals, at home, or through telerehabilitation has culminated in enhancing functional capacity, physical activity, and the quality of life in post-CABG patients.[16]

Based on the above explanation, this study aims to examine the adherence of CAD patients after revascularization to initiating, sustaining, and completing phase II CR program at Dr. Hasan Sadikin General Hospital (RSHS) which has integrated cardiac services. The results are expected to be used as a reference in improving the services for CAD patients undergoing phase II CR.

METHODS

This was a descriptive, cross-sectional study carried out using secondary data taken retrospectively from medical records. This study was conducted after obtaining approval from the Ethics Committee of the Faculty of Medicine, Universitas Padjadjaran No.75/UN6. KEP/EC/2020. The population was patients with CAD who underwent revascularization using the PCI and CABG methods as well as phase II CR at RSHS in 2019-2020. The inclusion criteria were patients with CAD post-revascularization and undergoing phase II CR from September 1st, 2019 – February 29th, 2020. Subjects were excluded when the medical record data were inaccessible, damaged, or illegible. Sample selection was carried out with the total sampling method by taking all medical record data that met the inclusion and exclusion criteria.

Data were processed using Microsoft Excel 2016 as well as IBM SPSS Statistics version 22, and

presented descriptively. The characteristics of subjects were described based on age, gender, level of education, occupation, domicile, type of revascularization measures, residential address, and insurance. These characteristic data were grouped based on the type of revascularization performed, namely PCI and CABG.

Adherence to CR program was determined by adopting the 2013 American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) guidelines for cardiovascular rehabilitation and secondary prevention. It was calculated from the time patients were discharged from phase 1 CR (hospital care) until their revisit for phase II CR which begins 1-2 weeks or 8 weeks post-treatment.[17] In this study, subjects were considered to be adherent when they initiated phase II CR within 1 week to 2 months after discharge. Adherence in sustaining the program was determined based on the attendance to complete phase II CR as assisted by the doctor 2 times a week for 6-12 weeks. Meanwhile, adherence to completing the program was determined based on the number of subjects who have completed phase II CR, as declared by the doctor and proven by the final evaluation data. The adherence to initiating, sustaining, and completing CR program was expressed in percentage. The results obtained were then grouped based on the characteristics of each subject to obtain a description of adherence.

RESULTS

A total of 96 subjects met the inclusion and exclusion criteria in this analysis with 12 or 12.5% being females and 84 or 87.5% males. Table 1 presents the demographic characteristics of the subjects divided into 2 groups based on the type of revascularization, with 74 and 22 people for CABG and PCI, respectively.

Based on age characteristics, the majority of the subjects were aged 55-64 years both in the CABG and PCI groups with 28 people (37.8%) and 10 people (45.5%), respectively. The majority of subjects were domiciled around Bandung City which has convenient access to RSHS, namely 49 (66.2%) and 14 (63.6%) people in the CABG and the PCI groups, respectively. Based on job characteristics, most of the subjects in the CABG group namely 22 people (29.7%) were private employees, while in the PCI group, more than 7 people (31.8%) were entrepreneurs or self-employed. Additionally, most of the subjects had health insurance, namely 69 (93.2%) and 22 (100%) people in the CABG and PCI groups, respectively.

Table 2 provides an overview of patients' adherence in following phase II CR. It was found that the level of adherence in initiating the program was high, with 94.6% in the CABG and 100% in the PCI group. A total of 50 (67.56%) and 16 (72.72%) subjects in both groups respectively participated in each training session prescribed. All subjects were given 1 episode of CR for 6 weeks or 12 training sessions. About 57 (77.02%) subjects in the CABG and 16 (72.72%) in the PCI group completed the 12 training sessions regardless of the time needed.

Table 1. Demographic Characteristics

Characteristics	Total	
	CABG n= 74	PCI n=22
Age, n (%)1		
35-44	3 (4.1%)	5 (22.7 %)
45-54	23 (31.8%)	3 (13.6 %)
55-64	28 (37.8%)	10 (45.5 %)
65-75	19 (25.6%)	2 (9 %)
75+	1 (1.4%)	1 (4.5 %)
Gender, n (%)		
Male	66 (89.2%)	18 (81.8 %)
Female	8 (10.8%)	4 (18.2 %)
Domicile, n (%)		
Bandung City	49 (66.2%)	14 (63.6%)
Bandung Regency	3 (41%)	3 (13.6%)
Bandung Barat Regency	2 (27%)	2 (9%)
Outside Bandung City	3 (41%)	3 (13.6%)
Educational Stage, n (%)		
Elementary School	0	0
Middle High School	4 (5.4%)	0
Senior High School	21(28.3%)	3 (13.6 %)
Diploma	7(9.5%)	4 (18.2 %)
Bachelor or higher	41(55.4%)	15 (6.2%)
Occupation, n (%)		
Entrepreneur	18 (24.3%)	7 (31.8%)
Housemaid	1 (13.5%)	2 (9 %)
Civil Servant	18 (24.3%)	3 (13.6 %)
Retiree	21 (28.3%)	6 (27.3%)
Employee	22 (29.7%)	4 (18.2%)
Laborer	4 (5.4%)	0
Health Assurance, n (%)		
Yes	69 (93.2%)	22 (100%)
No	5 (6.75%)	0

Table 2. Adherence in Following Phase II Cardiac Rehabilitation

Adherence Characteristic	Types of Revascularizations	
	CABG n=74	*PCI* n=22
Adherence to initiate, n (%)		
Yes	70 (94.6%)	22 (100%)
No	4 (5.04 %)	0
Adherence to sustain, n (%)		
Yes	50 (67.56%)	16 (72.72%)
No	24 (32.43%)	6 (27.7%)
Adherence to complete, n (%)		
Yes	57 (77.02%)	16 (72.72%)
No	17 (22.97 %)	6 (27.27%)

DISCUSSION

This study showed that, in general, the adherence in following phase II CR at RSHS was relatively high, above 65%. It was found that 94.6% and 100% of subjects in the CABG and PCI groups, respectively, initiated phase II CR. According to Soroush A et al., the referral rate for post-CABG patients to undergo phase II CR was very low (8.3%) and lower than the general referral rate in Iran, which was below 15%. Most of the cardiologists in Iran noted that the main reasons for the low referral rate were lack of awareness about the benefits of CR and health insurance, high costs, and difficulty in accessing CR centers.[18] However, this study did not assess referral rate as one of the factors to analyze the adherence to phase II CR. Regardless of the referral rate, it was found that 94.6% - 100% of patients started phase II CR as scheduled. This indicated that the low level of coverage can be determined by external factors such as low referral rates.

Subject adherence in sustaining phase II CR was 67.56% in the CABG and 72.72% in the PCI group. This was better than the result obtained by Chai Li Sze et al. wherein 72.6% of patients were absent and 12.1% dropped out before completing the program.[19] According to Pardaens S et al., patients who withdrew from CR prematurely had twice the risk of cardiovascular events or death than those who attended more than half of the sessions. In either the group of patients with acute coronary syndrome or post-PCI, withdrawal was associated with an adverse outcome in CR.[20]

The adherence in completing CR program was relatively high, namely 77.02% in the CABG and 72.72% in the PCI group. Several studies suggested that the health benefits of CR were related to patients' commitment and participation in completing the program for 12 weeks. Sze et al. found that the completion rate of CR among the referred and enrolled patients was low at 15.3%. Most of patients were absent or dropped out before completing all sessions. This was mainly due to the lack of motivation and encouragement to join and complete the program. 19 Heydarpour et al. reported that only 49% of patients completed CR program due to illiteracy, old age, employment status, low exercise capacity, depression, mild anxiety, and cessation

of smoking.21 Additionally, Bustamante J et al. found that adherence in completing the 36 training sessions given was low at 33% but it was better in the age group over 50, non-smokers, and previously active individuals.[22]

There have been no comparisons made in studies regarding adherence to CR between post-CABG and post-PCI patients. In this study, it was found that adherence to completing the program was high. Comparing the two groups, the adherence in initiating and sustaining phase II CR was higher in the post-PCI group. Post-CABG patients usually have more severe disabilities, older age, comorbidities, as well as a longer healing period,[23] which may have affected the adherence in following phase II CR.

This study has several limitations, including 1) it did not assess referral and registration levels which are important components in analyzing barriers in phase II CR, 2) retrospective data collection based on medical records is a limited method, and 3) short data collection period of about 6 months culminating in a fewer number of subjects compared to other studies. Therefore, further study is needed to specifically assess the factors affecting compliance in completing phase II CR in Indonesia. Investigations on the reference level and the factors influencing them are also needed. Both are required to increase the coverage of services and overcome obstacles in the implementation of phase II CR.

CONCLUSION

The level of adherence to initiating, sustaining, and completing phase II CR in post-revascularization CAD patients was relatively high. The level of adherence in initiating and sustaining phase II CR in post-PCI was higher than in post-CABG patients.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

ACKNOWLEDGEMENT

The authors are grateful to Kurnia Wahyudi, MD for the contribution provided to data analysis.

REFERENCES

1. Badan Penelitian dan Pengembangan Kesehatan. Riset Kesehatan Dasar Indonesia tahun 2018 [Internet]. Jakarta; 2019 [cited 13 Oktober 2019]. Avalaible on : http://www.depkes.go.id
2. Indonesia Sample Registration System – Death 2014[Internet]. Jakarta; 2014 [cited 2 November 2020]. Avalaible on : http://ghdx.healthdata.org/record/indonesia-sample-registration-system-deaths-2014
3. Holmes DRJ, Taggart DP. Revascularization in stable coronary artery disease: a combined perspective from an interventional cardiologist and a cardiac surgeon. Eur Heart J. 2016 Jun;37(24):1873–82.
4. Koba S, Ayaori M, Uto Kondo H, Furuyama F, Yokota Y, Tsunoda F, dkk. Beneficial effects of exercise-based cardiac rehabilitation on high-hensity lipoprotein-mediated cholesterol efflux capacity in

patients with acute coronary Syndrome. J Atheroscler Thromb. 2016; 23(7):865–77.

5. JCS Joint Working Group. Guidelines for rehabilitation in patients with cardiovascular disease (JCS 2012). Circ J. 2014; 78(8):2022–93.
6. NT Cardiac Secondary Prevention Framework. Cardiac Rehabilitation and Secondary Prevention : A framework for the Northern Territory. Department of Health, Aboriginal Medical Services Alliance of the Northern Territory, Baker IDI, Heart Foundation NT, Healthy Living NT, NT Cardiac. Casuarina. 2012.
7. Piepoli MF, Corrà U, Adamopoulos S, Benzer W, Bjarnason-wehrens B, Cupples M, dkk. Secondary prevention in the clinical management of patients with cardiovascular diseases. Core components, standards and outcome measures for referral and delivery. Eur J Prev Cardiol. 2014; 664–3481.
8. Dalal HM, Doherty P, Taylor RS. Cardiac rehabilitation. BMJ. 2015 Sep;351:h5000.
9. Turk-adawi KI, Oldridge NB, Tarima SS, Stason WB, Shepard DS. Cardiac Rehabilitation Patient and Organizational Factors : What. 2013;1–8.
10. Ong KY, Yap E, May Fen Chia Y, Tay HY, Ting P, Chan SY, Kwan YH. Impact of Community-Based Cardiac Rehabilitation on Clinical Parameters of Patients with Cardiovascular Diseases. ASEAN Heart J. 2016; 24:91-7.
11. Im HW, Baek S, Jee S, Ahn JM, Park MW, Kim WS. Barriers to outpatient hospital-based cardiac rehabilitation in korean patients with acute coronary syndrome. Ann Rehabil Med. 2018; 42(1):154-65.
12. Pouche M, Ruidavets J, Ferrières J, Iliou M, Douard H, Lorgis L, et al. Cardiac rehabilitation and 5-year mortality after acute coronary syndromes : The 2005 French FAST-MI study. Elsevier. 2016;178–87.
13. Marzolini S, Blanchard C, Alter DA, Grace SL, Oh PI. Delays in referral and enrolment are associated with mitigated benefits of cardiac rehabilitation after coronary artery bypass surgery. Circ Cardiovasc Qual Outcomes. 2015 Nov;8(6):608–20.
14. Pack QR, Goel K, Lahr BD, MS; Kevin L. Greason KL, Squires RW, Lopez-Jimenez F, Zhang Z. Participation in Cardiac Rehabilitation and Survival After Coronary Artery Bypass Graft Surgery A Community-Based Study. Circulation. 2013;128:590-7
15. Randal J. Thomas, MD, MSSjolin I, Back M, Nilsson L, Schiopu A, Leosdottir M. Association between attending exercise-based cardiac rehabilitation and cardiovascular risk factors at one-year post myocardial infarction. PLoS ONE. 2020; 15(5): e0232772
16. Prabhu NV, Maiya AG, Prabhu NS. Impact of Cardiac Rehabilitation on Functional Capacity and Physical Activity after Coronary Revascularization: A Scientific Review. Cardiol Res Pract. 2020; v2020:1-9.
17. American Association of Cardiovascular & Pulmonary Rehabilitation. Guidelines for Cardiac Rehabilitation and Secondary Prevention Programs. 5th ed. United States of America. 2013
18. Soroush A, Heydarpour B, Komasi S, Saeidi M, Ezzati P. Barriers for the referral to outpatient cardiac rehabilitation: A predictive model including actual and perceived risk

factors and perceived control. Ann Card Anaesth. 2018 Jul-Sep;21(3):249-54.

19. Chai Li Sze, Sidiah Siop, Lily Lim. Enrollment and attendance to Cardiac Rehabilitation after Percutaneous Coronary Intervention in Sarawak: A Prospective Study. International Journal of Recent Technology and Engineering (IJRTE). May 2019; 8:900-3.
20. Pardaens S, Willems A, Clays E, Baert A, Vanderheyden M, Verstreken S, Bois ID, Vervloet D, Sutter JD. The impact of drop-out in cardiac rehabilitation on outcome among coronary artery disease patients. [Cited 25 Januari 2021]. Avalaible on: https://journals.sagepub.com/doi/10.1177/2047487317724574
21. Heydarpour B, Saeidi M, Ezzati, Soroush A, Komasi S. Sociodemographic Predictors in Failure to Complete Outpatient Cardiac Rehabilitation. Ann Rehabil Med. 2015;39(6):863-71.
22. Bustamante MJ, Valentino G, Krämer V, Adasme M, Guidi D, Ibara C, dkk. Patient adherence to a cardiovascular rehabilitation program : what factors are Involved ? International Journal of Clinical Medicine. 2015; (6): 605–14.
23. Mendes M. Is There a Role for Cardiac Rehabilitation After Coronary Artery Bypass Grafting? There is No Role for Cardiac Rehabilitation After Coronary Artery Bypass Grafting. Circulation. 2016;133:2538–43.