MEDWIN PUBLISHERS
Committed to Create Value for Researchers

Medical Journal of Clinical Trials & Case Studies
ISSN: 2578-4838

Developing and Implementing a Hospital-based Family-centered Health Approach for Patients Undergoing Percutaneous Coronary Intervention: A Randomized Controlled Trial

Dorri N[1]*, Afrooz G[1], Noohi F[2] and Pourhosein R[3]

[1]Faculty of Psychology and Educational Sciences, University of Tehran, Tehran, Iran
[2]Rajaie Cardiovascular Medical and Research Center, Tehran, Iran
[3]Faculty of Psychology and Educational Sciences, University of Tehran, Tehran, Iran

***Corresponding author:** Negin Dorri, Health Psychology, Faculty of Psychology and Educational Sciences, University of Tehran, Tehran, Iran, Email: negin.dorri@ut.ac.ir

Research Article
Volume 7 Issue 3
Received Date: June 01, 2023
Published Date: July 03, 2023
DOI: 10.23880/mjccs-16000330

Abstract

Objectives: This study aimed to assess the effectiveness of a family-centered health program in promoting healthier lifestyles and improving self-care behavior among patients who had undergone percutaneous coronary intervention. We hypothesized that the family-centered health program would significantly enhance self-care and health-promoting lifestyle in this patient population. The current study was conducted to investigate the effectiveness of the family-centered health program on health-promoting lifestyle and self-care behavior in post-percutaneous coronary intervention patients.

Materials and Methods: A randomized controlled clinical trial was conducted from October 2021 to March 2022 at the Shaheed Rajaie Cardiovascular, Medical & Research Center in Tehran. The study population included patients aged 40 to 65 who had undergone percutaneous coronary intervention. Sixty eligible participants were selected through purposive sampling and randomly assigned to either an experimental group that underwent the family-centered health program (n=30) or a control group (n=30). Data were collected using a demographic information questionnaire, Walker's health-promoting lifestyle questionnaire (1987), and Miller's self-care behavior questionnaire (1982) at three time points: baseline, post-intervention, and three-month follow-up. The intervention's effectiveness was assessed using variance analysis with repeated measurements in SPSS-21 software.

Results: Preliminary analyses revealed no significant differences between the groups in self-care, health-promoting lifestyle, or blood pressures, indicating the two groups were homogeneous at baseline. However, post-test comparisons revealed significant differences, suggesting the family-centered health program was effective ($P < 0.001$).

Conclusions: Given the demonstrated effectiveness of the family-centered health program, prioritizing such interventions could significantly improve secondary prevention outcomes in patients surviving coronary heart disease.

Keywords: Coronary Heart Disease; Percutaneous Coronary Intervention; Hospital-based; Patient Empowerment; Family-centered Health Approach

Abbreviations: CHD: Coronary Heart Disease; IVUS: Intravascular Ultrasound; LS: Lifestyle; DM: Diabetes Mellitus; PA: Physical Activity; LDL-C: Low-Density Lipoprotein Cholesterol; HDL-C: High-Density Llipoprotein Cholesterol; HTN: Hypertension; SP: Secondary Prevention; CVH: Cardiovascular Health; UHC: Universal Health Care;

PE: Patient Empowerment; HL: Health Literacy; USDHHS: US Department of Health and Human Services, AHA: American Heart Association; NHS: National Health Service, NCDs: Non-Communicable Diseases; WHO: World Health Organization; SC: Self-Care; HIC: High-Income Countries; IRCT: Iranian Registry of Clinical Trials; HPLP II: Health-Promoting Lifestyle Profile II; ES: Educational Sessions; ANOVA: Analysis of Variance; HP: Health Promotion; IRCT: Iranian Registry of Clinical Trials.

Introduction

Coronary heart disease (CHD), characterized by plaque, indicating the pathological process of atherosclerosis, is responsible for 9 million deaths worldwide [1-5]. Preventive strategies, namely medical therapy, non-intensive interventions (e.g., percutaneous coronary intervention: PCI), and intensive surgical treatments (e.g., coronary artery bypass graft surgery: CABG), significantly improve the long-term prognosis of individuals diagnosed with CHD through early detection [6-8].

Percutaneous coronary intervention, the most common procedure for CHD, is accomplished via balloon angioplasty, stent implantation, atherectomy, intravascular ultrasound (IVUS), or brachytherapy [9-12]. However, despite the chosen therapeutic methods by the cardiologists and the performed PCI procedure, in order to prevent and postpone any future heart conditions, lifestyle (L.S.) modification, including, but not limited to, maintaining a heart-healthy diet, diabetes mellitus (D.M.) and weight management, physical activity (P.A.), avoiding first- or secondhand smoke, low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C) and hypertension (HTN) monitoring and control, remain as essential fragments of secondary prevention (S.P.), in patients with established CHD [13-17]. Additionally, longitudinal and systematic studies, on post-PCI patients, despite the gender, age, and race, have suggested that maintaining a healthy L.S., and ideal cardiovascular health (CVH), was associated with a reduction of CHD recurrence, even several years after the procedure [18-21].

The worldwide aim to achieve universal health care (UHC) and CVH has long led to a shift from a biomedical model toward patient-centered care [22,23]. Therefore, the hospitals, remaining at the uppermost hierarchy of treatments, are now implying multisector interventions for patient empowerment (P.E.) by increasing health literacy (H.L.) at a personal and organizational categorization (Table 1), beneficial to promoting healthy behaviors according to the nation's socioeconomic and cultural necessities [24-33].

From an evolutionary point of view, the concept of P.E. and H.L. arose once many healthcare systems and associations around the world, namely, the U.S. Department of Health and Human Services (USDHHS), the American Heart Association (AHA), the Swedish National Board of Health and Welfare (Socialstyrelsen), and the National Health Service (NHS), in the United Kingdom, combined H.L. into the preventive medicine and medical management, and shifted their focus from an adherence and compliance approach to a multisector collaboration method towards patient-centered care in order to take patients values and preferences into account, personalize a healthy L.S. accordingly, with the aim of patients involvement on their treatment journey, mainly for non-communicable diseases (NCDs) [34-39].

The world health organization's (WHO) Global Action Plan for the Prevention and Control of Non-Communicable Diseases determines P.E. as "Empower[ing] people with NCDs to seek early detection and manage their condition better, and provide education, incentives, and tools, for self-care and self-management, based on evidence-based guidelines, patient registries, and team-based patient management, promoting a patient-centered, psychosocial and culturally sensitive approach combined with interdisciplinary teamwork" [40]. Furthermore, WHO has defined self-care (S.C.) as "The ability of individuals, families, and communities to promote health, prevent disease, maintain health, and cope with illness and disability with or without the support of a health worker" [41].

According to the studies, low H.L. is an obstacle to S.C. and L.S. behavioral changes in patients' post-PCI health status. Longitudinal studies found that hospital readmissions within a month of PCI are 75% higher amongst patients with limited H.L. [42,43]. Numerous studies suggest that hospital-based and pre-discharge educational strategies improve treatment outcomes and reduce atherosclerosis recurrence, resulting in CHD [44-46]. However, the S.C. and management of CHD do not happen in solitary [47] (Table 1).

Personal Health Literacy (PHL), "The degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others."
Organizational Health Literacy (OHL), "The degree to which organizations equitably enable individuals to find, understand, and use information and services to inform health-related decisions and actions for themselves and others."

Table 1: Personal and Organizational Health Literacy. Retrieved from The Centers for Disease Control and Prevention, Healthy People 2030; National Guidelines to Promote Health and Prevent Disease, definition of PHL and OHL [48].

The worldwide approach to P.E. and health promotion calls for an integrated attribution toward well-being and the quality of care [49-51]. As the invisible agents of promoting healthy behaviors in day-to-day life, families are considered essential assets to health professionals [52-54]. Conversely, in comparison to the high-income countries (HIC), the inverse relation of sustaining a healthy lifestyle and failure to implement a clinically acceptable S.C. in post-PCI patients has led to a more significant burden of hospitalizations events to the healthcare system in middle-upper middle- and low-income countries (MICs, UMICs, LICs) [55-62]. Current knowledge about multi-level collaborative approaches, to hospital-based S.P., in CHD patients is mainly based on research conducted at HIC Populations [63-66]. Hence, the present study aims to investigate the effects of a short-term multisector-hospital-based, family-centered health approach on H.L. interventions to promote health and SC, PCI-treated patients, and their families. We hypothesized that patients who participate in the family-centered health program would demonstrate significantly improved health literacy, leading to better self-care and healthier lifestyles.

Methods and Materials

Ethics and Participations

The Iran National Committee for Ethics in Biomedical Research granted the authorization, ethics, and clinical registry and got approved by the Iranian Registry of Clinical Trials (IRCT). This study occurred at Shaheed Rajaie Cardiovascular, Medical and Research Center (the Cardiology Center of Iran University of Medical Sciences), Tehran, PCI performed patients from December 2021 to February 2022. Using a random sampling technique, the patients and their spouses (n= 120) were initially evaluated. The inclusion criteria were male patients with no severe comorbidities, household residents aged 40-65, and in-hospital PCI-treated. Exclusion criteria were a history of CABG. Notably, primary-PCI patients were considered qualified; however, patients with a history of CABG were excluded from this study.

Demographic Data

Medical genogram: For our study group (n=60), demographic data were gathered using a self-report, medical history, and recording patient and his significant other, three generations (parents, siblings, and the children) information to map graphical representations of the family's medical conditions. In this context, "family medical conditions" refer to any diagnosed diseases or disorders among the patient's immediate family members. General data, including date of birth and death, smoking and other drug uses status; alcohol consumption, obesity, and history of any cardiovascular events, hypertension, lipid profile, cancer, diabetes, and any clinical diagnosis of mental disorders, using specific symbols were gathered. The information was displayed in a medical genogram for each family.

Measurement of self-care: Miller's (1982) self-care behavior questionnaire was used to measure self-care behavior. "Self-care behavior" in this study is defined as actions and habits that contribute to maintaining or improving the patient's health, including adherence to prescribed medications, diet and exercise regimens, and avoidance of harmful behaviors such as smoking. This questionnaire has 20 items about drug regimen, diet control, exercise performance, stress modification, and smoking cessation rated on a 5- pointed Likert scale ranging from 20 to 100, with the highest score indicating better self-care behavior. Each domain has four questions about self-care.

Measurement of health promoting: The Health-Promoting Lifestyle Profile II (HPLP II) was used to measure health-promoting behavior, defined here as actions initiated by the patient that contribute to their overall well-being, personal growth, and fulfillment. Conceptualized as a multidimensional pattern of self-initiated actions and perceptions that maintain or enhance the individual's level of wellness, self-actualization, and fulfillment. The 52-item scale employs a 4-point response format to measure the frequency of self-reported health-promoting behaviors in health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations, and stress management.

Intervention Method

Intervention participants received up to three to four in-hospital educational sessions (ES) visits, depending on the duration of their stay (approximately 45 minutes per visit). The remaining educational session was via telephone and delivered to the patient and his wife separately and during different hours after discharge. Each participant was encouraged, where possible, to invite all family members to the ES. After discharge, the time between each ES ranged from 5 to 7 days. The program delivered to the intervention group—the family-centered health group—was a complex model utilizing a combination of the "small-changes" approach and group motivational interviewing techniques to encourage adherence to treatment for the patients and a healthy lifestyle for the family as a whole (Table 2).

Sessions	Brief Description
Session 1	Educational session (ES) about the Cardiovascular system and the risk factors. Gathering demographic information, drawing patients Medical Genogram and describing the influence of families shared environment and behavioral patterns.
Session 2	Gathering demographic information from the patients' significant other, and explaining the environmental risk factors of cardiovascular disease.
Session 3	ES on self-care, individual family self-management (IFSM) and regulation.
Session 4	ES on behavioral change, the concept of IFSM: medical adherence, monitoring blood pressure, heart healthy diet, and weight management.
Session 5	Expanding the concept of behavioral change and IFSM: Controlling stress and Sleep Hygiene and sexual intimacy.
Session 6	Managing health, modelling steps and setting family goals for a healthy lifestyle, reviewing the action plan and managing challenges.
The First Follow-up	Sending the medical Genogram and explaining the possible daily habits effecting the health related behavioral patterns of the family as a system
The Second Follow-up	Register the patient and significant other as the Family's Health Ambassador of Rajaie Cardiovascular, Medical and Research Center for the primary and secondary prevention in order to monitor and educate a greater population.

Table 2: The Family-centered Health Program Sessions Description.

Results

According to Table 3, the average age of the participants was 53.68 ± 7.53. The average age of the participants in the experimental and control groups was 53.79 ± 6.27 and 54.56 ± 9.47, respectively. The highest frequency was seen in the age group under 50 years (31.91%), including 30 people. This age group also had the highest frequencies in the experimental and control groups, with 12 (36.36%), 10, and 8 (25.00%), respectively. Regarding education level, the highest frequency was a high school diploma with 37 subjects (39.36%). High school diplomas also constituted the highest frequency in the experimental and control groups, with 12 (36.36%), 10 (34.48%), and 15 (46.88%) subjects. Self-employment had the highest frequency, with 53 (56.38%) participants. It also had the highest frequency among the two groups. Overall, 16 subjects (17.02%) were unemployed. 16 subjects (48.94%) had a history of cardiovascular disease.

Variable	Category	Group		Total	Significance level
		Control	Family		
Age	-----	54/56± 9/47	53/79±6/27	7/53±53/68	0/594
Grouped Age	50≤	8 (25/00)	12 (36/36)	30 (31/91)	0/315
	51-55	7 (21/88)	7 (21/21)	25 (26/60)	
	56-60	8 (25/00)	10 (30/30)	22 (23/40)	
	61-65	6 (18/75)	4 (12/12)	14 (14/89)	
	66-70	3 (9/38)		3 (3/19)	
Education level	PhD	1 (3/13)	1 (3/03)	2 (2/13)	0/091
	MA	2 (6/25)		4 (4/26)	
	BA	4 (12/50)	7 (21/21)	21 (22/34)	
	Diploma	15 (46/88)	12 (36/36)	37 (39/36)	
	Associate Degree		2 (6/06)	3 (3/19)	
	Middle School	9 (28/13)	11 (33/33)	23 (44/27)	
Occupation	Unemployed	7 (21/81)	6 (18/18)	16 (17/02)	0/514
	Employed	25 (78/13)	27(81/82)	78 (82/98)	

Table 3: Descriptive statistics of demographic variables.

Table 4 shows the mean, standard deviation, and Shapiro-Wilk statistics for the participant's scores in the three groups of family-centered health programs and control over the pre-test, post-test, and follow-up stages. As can be seen, the data distribution was normal.

Variable	Status	Group	Mean	Standard deviation	Shapiro-Wilks	Significance level
Spiritual Growth	Pre-test	Family-centered health program	13.41	1.06	0.904	0.08
	Post-test	Control	13.68	1.25	0.881	0.04
		Family-centered health program	20.41	0.87	0.878	0.03
	Follow-up	Control	13.75	1.23	0.858	0.058
		Family-centered health program	21.17	0.8	0.862	0.056
Physical activity/ Exercise	Pre-test	Control	13.56	1.15	0.887	0.049
		Family-centered health program	9.41	1.17	0.901	0.07
	Post-test	Control	9.25	1	0.887	0.045
		Family-centered health program	15.76	1.2	0.907	0.09
		Control	9.12	1.02	0.862	0.021
	Follow-up	Family-centered health program	15.58	1.12	0.881	0.033
		Control	8.93	0.99	0.828	0.006
Health Responsibility	Pre-test	Family-centered health program	15.11	1.61	0.962	0.0665
	Post-test	Control	15.37	1.2	0.867	0.024
		Family-centered health program	10.52	1.5	0.924	0.17
	Follow-up	Control	15.25	1.34	0.877	0.035
		Family-centered health program	10.35	1.27	0.917	0.132
		Control	15.37	1.4	0.883	0.044
Stress Management	Pre-test	Family-centered health program	8.88	1.31	0.913	0.113
		Control	9	1.31	0.901	0.084
	Post-test	Family-centered health program	16.17	1.28	0.89	0.046
		Control	9.06	1.28	0.917	0.146
	Follow-up	Family-centered health program	16.35	1.22	0.81	0.053
		Control	8.88	1.31	0.913	0.113
Interpersonal Relationships	Pre-test	Family-centered health program	21.88	2.18	0.976	0.907
	Post-test	Control	21.43	1.86	0.933	0.267
		Family-centered health program	15.17	1.94	0.963	0.695
	Follow-up	Control	21.56	1.78	0.972	0.875
		Family-centered health program	14.88	1.86	0.943	0.358
Nutrition Follow-up	Pre-test	Control	21.56	1.5	0.926	0.207
		Family-centered health program	13.64	1.53	0.931	0.227
	Post-test	Control	13.62	1.36	0.916	0.145
		Family-centered health program	6.35	1.11	0.892	0.049
		Control	13.68	1.3	0.873	0.03
	Follow-up	Family-centered health program	6.52	1.23	0.911	0.103
		Control	13.68	1.25	0.947	0.448

Table 4: Mean, standard deviation, and Shapiro-Wilks statistic of health-promoting lifestyle components.

Table 5 shows that Levene's test is not significant for any of the stages of the research; Therefore, the assumption of homogeneity of variances was met for the health-promoting lifestyle variable in the three stages. The results of Mauchly's sphericity test show that the assumption of the equality of variances within the subjects was not established for the components of spiritual excellence. The Greenhouse-Geisser's epsilon value for the components of spiritual excellence, responsibility for health, and stress management was more significant than 0.75. Therefore, the Huynh-Feldt test was used to examine these subscales, while the Greenhouse-Geisser test was used to examine the subscales of physical activity, unhealthy diet, and interpersonal problems.

Default	Variable	Stage	Degree of freedom 1	Degree of freedom 2	F	Significance level
Homogeneity of Variances	Spiritual Growth	Pre-test	2	72	1.18	0.316
		Post-test	2	72	3.55	0.036
		Follow-up	2	72	1.38	0.261
	Physical Activity	Pre-test	2	72	0.204	0.816
		Post-test	2	72	0.57	0.569
		Follow-up	2	72	0.52	0.598
	Health Responsibility	Pre-test	2	72	0.785	0.462
		Post-test	2	72	0.291	0.749
		Follow-up	2	72	1.38	0.259
	Stress Management	Pre-test	2	72	0.449	0.641
		Post-test	2	72	0.003	0.997
		Follow-up	2	72	0.458	0.635
	Interpersonal Relationship	Pre-test	2	72	0.424	0.657
		Post-test	2	72	0.307	0.737
		Follow-up	2	72	1.29	0.284
	Nutrition	Pre-test	2	72	0.467	0.63
		Post-test	2	72	0.313	0.733
		Follow-up	72	72	0.275	0.761
Intra-subject Variances		Variable	Significance Level	Degree of Freedom	Chi-square Statistic	Mauchly's Test Statistic
		Espiritual Growth	0.001	2	13.64	0.753
		Physical Activity	0.001	2	30.05	0.535
		Health Responsibility	0.026	2	7.32	0.859
		Stress Management	0.001	2	13.09	0.761
		Interpersonal Relationship	0.001	2	21.08	0.645
		Nutrition	0.001	2	32.45	0.509

Table 5: Results of Levene's and Mochly's tests for health-promoting lifestyle components.

Table 6 shows that family-centered health programs had an increasing effect on the components of a health-promoting lifestyle (P=0.001). Compared to the pre-test stage, the components of a health-promoting lifestyle were improved under the effect of time (P=0.001). The interaction effect of time*group resulted in an increase in the components of health-promoting lifestyle (P=0.001) compared to the control group.

		Variable	Degree of Freedom	Degree of Freedom	Mean of Squares	F	P-value
Espiritual Growth	Group effect	931.88	2	465.94	263.65	0	0.915
	Time effect	902.06	1.71	525.39	765.42	0	0.94
	Interaction effect	446.59	3.43	130.05	189.47	0	0.886
Physical Activity	Group effect	698.28	2	349.14	165.23	0	0.871
	Time effect	635.21	1.36	478.59	512.97	0	0.913
	Interaction effect	351.92	2.73	128.92	138.18	0	0.849
Health Responsibility	Group effect	363.17	2	181.58	37.67	0	0.606
	Time effect	349.9	1.88	185.52	518.78	0	0.914
	Interaction effect	162.96	162.96	162.96	120.8	0	0.831
Stress Management	Group effect	760.07	2	380.03	94.91	0	0.915
	Time effect	811.773	1.72	469.37	772.73	0	0.94
	Interaction effect	668.65	2.54	262.48	182.31	0	0.886
Interpersonal Relationships	Group effect	554.387	2	277.18	34.43	0	0.871
	Time effect	744.36	1.57	473.38	358.86	0	0.913
	Interaction effect	380.96	2.95	129.09	91.83	0	0.849
Nutrition	Group effect	723.49	2	361.74	88.78	0	0.606
	Time effect	694.46	1.34	517.85	721.28	0	0.914
	Interaction effect	346.19	20.68	129.07	179.78	0	0.831

Table 6: Results of analysis of variance (ANOVA) with repeated measurements in explaining the effect of independent variables on the components family-centered lifestyle.

Table 7 shows that family-centered health programs had an increasing effect on the components of self-care behaviors (P=0.001). The components of self-care behaviors were improved under the effect of time (P=0.001) compared to the pre-test stage. The interaction effect of the time*group also improved the components of self-care behaviors (P=0.001) compared to the control group.

		Variable	Mean of Squares	Degree of Freedom	Mean of Squares	F	P-value
Modify Diet	Group effect	527.33	2	263.66	40.34	0	0.622
	Time effect	519.84	1.87	277.73	913.97	0	0.949
	Interaction effect	368.01	3.74	98.3	323.51	0	0.93
Reduce Smoking	Group effect	113.89	2	56.94	48.51	0	0.664
	Time effect	202.69	1.44	139.88	322.51	0	0.868
	Interaction effect	79.06	2.89	27.28	62.9	0	0.72
Exercise	Group effect	77.88	2	38.94	38.15	0	0.609
	Time effect	264.12	1.86	141.61	504.04	0	0.911
	Interaction effect	149.15	3.73	39.98	142.32	0	0.853
Administer Medications	Group effect	419.07	2	209.53	91.44	0	0.789
	Time effect	342.63	1.78	191.99	681.89	0	0.933
	Interaction effect	243.59	3.56	68.25	242.4	0	0.908
Manage Stress	Group effect	365.64	2	182.82	100.61	0	0.804
	Time effect	366.71	1.97	204.12	866.81	0	0.946
	Interaction effect	159.18	3.59	44.3	188.12	0	0.885

Table 7: Results of analysis of variance (ANOVA) with repeated measurements in explaining the effect of independent variables on the components of self-care behaviors.

Discussion

This randomized controlled hospital-based interventional trial at Shaheed Rajaie Cardiovascular, Medical and Research Center, Tehran, Iran 2021–2022 showed significant improvement in self-care behaviors and health-promoting lifestyle changes in post-PCI patients PCI, compared to patients with no hospital-based family-centered health education sessions. From the results of the study, compared to the control group, the family-centered health program had an increasing effect on self-care behaviors as well as health responsibility, physical activity, interpersonal relationships, nutrition, spiritual growth stress management, components in post-PCI patients and its effect was steady during the follow-up period.

According to European Patients' Forum, patient empowerment is defined as a "process that helps people gain control over their own lives and increases their capacity to act on issues that they define as important" and is a critical issue in global health and social care strategies [67]. Care models incorporating patient empowerment strategies are increasingly being adopted to reduce the impact of reducing complications on patients dealing with chronic diseases and deducting the demands placed on health and social care services. Self-care and health-promoting lifestyles are vital features in most patient empowerment constructs, with an increasing number of measures in practice to assess, monitor and promote these features. In the research literature, in line with empowering patients, self-care includes providing knowledge and teaching activities to promote health, prevent diseases, and promote health literacy in societies [68].

Health promotion (HP) has been defined as "the process of enabling people to increase control over and to improve their health" [69]. HP emphasizes various aspects of individuals' environmental factors by embracing social factors. As a core public health function, HP supports communities and individuals to manage and adapt to their illnesses and chronic conditions [70]. One of the main factors of health promotion is health literacy, which includes any activity aimed at increasing health awareness, and its purpose is to promote health and prevent disease and illnesses [71]. In addition, Raei, et al. [72], while investigating the effectiveness of the family-centered empowerment model in following the treatment of post-PCI patients, reported that improving family health literacy along with the patient is correlated with reducing stress, improving physical activity and health-related quality of life [72]. Duncan S, et al. concluded that family-based approaches that target caregivers and patients and pay attention to the structural and environmental conditions in which families live could be the most effective approach to promote cardiovascular health at three levels of prevention [73]. Goldfarb, et al. in a scientific statement from the American Heart Association involving families in cardiovascular care, stated that family involvement empowers family members to become active partners in providing care. Family members increasingly expect and desire to participate in caregiving and participate in the decision-making process. The goal of involving families in care is to improve the care experience to achieve better outcomes for patients and family members [74].

Our study has a few limitations. Firstly, the small sample size of this study is one of the limitations that prevented the accurate estimation of the effect size of the program. Secondly, the participant and the samples of this research were limited to patients diagnosed with coronary heart disease. The mentioned conditions make the generalization of the results cautious.

Conclusion

This study developed a family-centered health program to improve and promote healthy lifestyles and increase self-care behaviors for post-PCI patients. The multidisciplinary program consisted of primary education on lifestyle modifications, professional counselling, and nutritional and physical activities educational sessions according to the patient's needs. The detailed content of the intervention was informed by health-promoting lifestyle and the health belief theory. Based on the study's results, the family-centered health approach effectively enhanced patients' health-promoting lifestyle and self-care behaviors, validating our hypothesis and highlighting the potential benefits of this approach in managing cardiovascular risk factors.

Acknowledgment

This paper and its research would not have been possible without the exceptional support of the patients and medical care team at Shaheed Rajaie Cardiovascular, Medical & Research Center.

Ethical Approval

The Iran National Committee for Ethics in Biomedical Research granted this study's authorization, ethics, and clinical registry and was approved by the Iranian Registry of Clinical Trials (IRCT).

Conflict of Interest

The author(s) declared no potential conflicts of interest concerning this article's research, authorship, and publication.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

1. AHA (2020) What is Atherosclerosis? American Heart Association.
2. Shahjehan RD, Bhutta BS (2022) Coronary Artery Disease. StatPearls, Treasure Island.
3. Severino P, D'Amato A, Pucci M, Infusino F, Adamo F, et al. (2020) Ischemic Heart Disease Pathophysiology Paradigms Overview: From Plaque Activation to Microvascular Dysfunction. International Journal of Molecular Sciences 21(21): 8118.
4. De JA, Omland T (2018) Chronic Coronary Artery Disease: A Companion to Braunwald's Heart Disease. Elsevier.
5. Wang F, Yu Y, Mubarik S, Zhang Y, Liu X, et al. (2021) Global Burden of Ischemic Heart Disease and Attributable Risk Factors, 1990-2017: A Secondary Analysis Based on the Global Burden of Disease Study 2017. Clinical Epidemiology 13: 859-870.
6. Bauersachs R, Zeymer U, Brière JB, Marre C, Bowrin K, et al. (2019) Burden of Coronary Artery Disease and Peripheral Artery Disease: A Literature Review. Cardiovascular Therapy 2019: 8295054.
7. Malakar AK, Choudhury D, Halder B, Paul P, Uddin A, et al. (2019) A review on coronary artery disease, its risk factors, and therapeutics. Journal of Cell Physiology 234(10): 16812-16823.
8. Arnett DK, Blumenthal RS, Albert MA, Goldberger ZD, Hahn EJ, et al. (2019) 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Circulation 140(11): e596-e646.
9. Fitchett DH, Gupta M, Farkouh ME, Verma S (2014) Cardiology Patient Page: coronary artery revascularization in patients with diabetes mellitus. Circulation 130(12): e104-e106.
10. Ahmad M, Mehta P, Reddivari AKR, Mungee S, et al. (2022) Percutaneous Coronary Intervention. StatPearls. Treasure Island (FL): StatPearls Publishing.
11. Godoy LC, Rao V, Farkouh ME (2019) Coronary Revascularization of Patients with Diabetes Mellitus in the Setting of Acute Coronary Syndromes. Circulation 140(15): 1233-1235.
12. Emamgholipour S, Moeini S (2022) Comparison of the Economic Burden between Coronary Artery Bypass Grafting and Percutaneous Coronary Intervention at a One-Year Follow-up. Iran Heart Journal 3(1): 106-111.
13. Collet C, Capodanno D, Onuma Y, Banning A, Stoneet GW, et al. (2018) Left main coronary artery disease: pathophysiology, diagnosis, and treatment. Nature Reviews Cardiology 15(6): 321-331.
14. Kones R (2011) Primary prevention of coronary heart disease: integration of new data, evolving views, revised goals, and role of rosuvastatin in management. A comprehensive survey. Drug Design, Development and Therapy 5: 325-380.
15. Kärner Köhler A, Tingström P, Jaarsma T, Nilsson S (2018) Patient empowerment and general self-efficacy in patients with coronary heart disease: a cross-sectional study. BMC Family Practice 19(1): 76.
16. Lee YM, Kim RB, Lee HJ, Kim K, Shin MH, et al. (2018) Relationships among medication adherence, lifestyle modification, and health-related quality of life in patients with acute myocardial infarction: a cross-sectional study. Health and Quality of Life Outcomes 16(1): 100.
17. Brinks J, Fowler A, Franklin BA, Dulai J (2016) Lifestyle Modification in Secondary Prevention: Beyond Pharmacotherapy. American Journal of Lifestyle Medicine 11(2): 137-152.
18. Blokstra A, van Dis I, Verschuren WM (2011) Efficacy of multifactorial lifestyle interventions in patients with established cardiovascular diseases and high-risk groups. European Journal of Cardiovascular Nursing 11(1): 97-104.
19. Lv J, Yu C, Guo Y, Bian Z, Yang L, et al. (2017) Adherence to Healthy Lifestyle and Cardiovascular Diseases in the Chinese Population. Journal of the American College of Cardiology 69(9): 1116-1125.
20. Wang Y, Xian Y, Chen T, Zhao Y, Yang J, et al. (2020) Effect of Lifestyle Changes after Percutaneous Coronary Intervention on Revascularization. BioMed Research International 2020: 2479652.
21. Bundy JD, Ning H, Zhong VW, Paluch AE, Lloyd-Joneset DM, et al. (2020) Cardiovascular Health Score and Lifetime Risk of Cardiovascular Disease: The Cardiovascular Lifetime Risk Pooling Project. Circulation: Cardiovascular Quality and Outcomes 13(12): e006450.

22. Palumbo R (2017) The Bright Side and the Dark Side of Patient Empowerment: Co-Creation and Co-Destruction of Value in the Healthcare Environment. Springer.

23. Nikpour Hernandez N, Ismail S, Heang H, van Pelt M, Witham MD, et al. (2021) An innovative model for management of cardiovascular disease risk factors in the low resource setting of Cambodia. Health Policy and Planning 36(4): 397-406.

24. Umar A, Mundy D (2015) Re-thinking Models of Patient Empowerment. Studies in Health Technology and Informatics 209: 175-181.

25. Castro EM, Van Regenmortel T, Vanhaecht K, Sermeus W, Van Hecke A (2016) Patient empowerment, patient participation, and patient-centeredness in hospital care: A concept analysis based on a literature review. Patient Education and Counseling 99(12): 1923-1939.

26. Nallamothu BK, Tommaso CL, Anderson HV, Anderson JL, Cleveland JC et al. (2014) ACC/AHA/SCAI/AMA-Convened PCPI/NCQA 2013 Performance Measures for Adults Undergoing Percutaneous Coronary Intervention: A Report of the American College of Cardiology/ American Heart Association Task Force on Performance Measures, the Society for Cardiovascular Angiography and Interventions, the American Medical Association-Convened Physician Consortium for Performance Improvement, and the National Committee for Quality Assurance. Circulation 129(8): 926-949.

27. Ljung S, Olsson C, Rask M, Lindahl B (2013) Patient Experiences of a Theory-Based Lifestyle-Focused Group Treatment in the Prevention of Cardiovascular Diseases and Type 2 Diabetes. International Journal of Behavioral Medicine 20: 378-384.

28. Li J, Yu J, Chen X, Quan X, Zhou L (2018) Correlations between health-promoting lifestyle and health-related quality of life among elderly people with hypertension in Hengyang, Hunan, China. Medicine 97(25): e10937.

29. CDC Public Health Grand Rounds (2017) Overcoming Barriers to Medication Adherence for Chronic Diseases.

30. CDC (2019) What is Health Literacy? Centers for Disease Control and Prevention.

31. Santana S, Brach C, Harris L, Ochiai E, Blakey C, et al. (2021) Updating Health Literacy for Healthy People 2030: Defining Its Importance for a New Decade in Public Health. Journal of Public Health Management and Practice 27(1): 75-77.

32. Brach C, Harris L (2021) Healthy People 2030 Health Literacy Definition Tells Organizations: Make Information and Services Easy to Find, Understand, and Use. Journal of General Internal Medicine 36(1): 12-15.

33. WHO (2022) Health Promotion. World Health Organization.

34. Kärner Köhler A, Tingström P, Jaarsma T, Nilsson SG (2018) Patient empowerment and general self-efficacy in patients with coronary heart disease: a cross-sectional study. BMC Family Practice 19(1): 76.

35. Bravo P, Edwards A, Barr PJ, Scholl I, Elwyn G, et al. (2015) Conceptualising patient empowerment: a mixed methods study. BMC Health Services Research 15: 252.

36. Lönnberg L, Damberg M, Revenäs A (2020) It's up to me: the experience of patients at high risk of cardiovascular disease of lifestyle change. Scandinavian Journal of Primary Health Care 38(3): 340-351.

37. Navarro M (2020) Patients' empowerment and the role of patients' education. Medical Research Archives 8(12).

38. Magnani JW, Mujahid MS, Aronow HD, Cené CW, Dickson VV, et al. (2018) Health Literacy and Cardiovascular Disease: Fundamental Relevance to Primary and Secondary Prevention: A Scientific Statement from the American Heart Association. Circulation 138(2): e48-e74.

39. Gulati M, Levy PD, Mukherjee D, Amsterdam E, Bhatt DL, et al. (2021) 2021 AH A/ACC/ASE/CHEST/SAEM/SCCT/ SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/ American Heart Association Joint Committee on Clinical Practice Guidelines. Circulation 144(22): e455.

40. World Health Organization, Regional Office for Europe, Chaudhry S, Anbreen, Alain G (2019) Patient education and self-management support for chronic disease: methodology for implementing patient-tailored therapeutic programmes. Public Health Panorama 5(2-3): 357-361.

41. WHO (2021) WHO Guideline on self-care interventions for health and well-being, World Health Organization.

42. Hirooka N, Kusano T, Kinoshita S, Aoyagi R, Saito K, et al. (2022) Association between health literacy and purpose in life and life satisfaction among health management specialists: a cross-sectional study. Scientific Reports 12(1): 8310.

43. Beauchamp A, Talevski J, Nicholls SJ, Shee AW, Martin C, et al. (2022) Health literacy and long-term health outcomes following myocardial infarction: protocol for

a multicentre, prospective cohort study (ENHEARTEN study). BMJ Open 12(5): e060480.

44. Desai AD, Popalisky J, Simon TD, Mangione-Smith RM (2015) The effectiveness of family-centered transition processes from hospital settings to home: a review of the literature. Hospital Pediatrics 5(4): 219-231.

45. Jeemon P, Harikrishnan S, Ganapathi S, Sivasankaran S, Binukumar B, et al. (2021) Efficacy of a family-based cardiovascular risk reduction intervention in individuals with a family history of premature coronary heart disease in India (PROLIFIC): an open-label single-centre cluster randomised controlled trial. The Lancet Global Health 9(10): e1442-e1450.

46. Benoit C, Lopez D, Loiseau M, Labreuche J, Kyheng M, et al. (2020) Impact of a Pre-Discharge Education Session on Stroke Knowledge: A Randomized Trial. Journal of Stroke and Cerebrovascular Diseases 29(12): 105272.

47. Rapelli G, Donato S, Pagani AF, Parise M, Iafrate R, et al. (2021) The Association Between Cardiac Illness-Related Distress and Partner Support: The Moderating Role of Dyadic Coping. Frontiers in Psychology 12: 624095.

48. Healthy People 2030 Questions & Answers.

49. WHO (2015) European strategic directions towards Health 2020 goals. Copenhagen, World Health Organization Regional Office for Europe.

50. Redding D (2013) The narrative for person-centred coordinated care. Journal of Integrated Care 21(6): 315-325.

51. Barnes MD, Hanson CL, Novilla LB, Magnusson BM, Crandall AC, et al. (2020) Family-Centered Health Promotion: Perspectives for Engaging Families and Achieving Better Health Outcomes. Inquiry 57.

52. Michaelson V, Pilato KA, Davison CM (2021) Family as a health promotion setting: A scoping review of conceptual models of the health-promoting family. PLoS One 16(4): e0249707.

53. WHO (2013) Family as centre of health development: Report of the regional meeting, Bangkok, Thailand, 18-20 March 2013. World Health Organization Regional Office for South-East Asia.

54. Park H, Lee KS (2020) The association of family structure with health behaviour, mental health, and perceived academic achievement among adolescents: a 2018 Korean nationally representative survey. BMC Public Health 20(1): 510.

55. Gaudel P, Kaunonen M, Neupane S, Joronen K, Koivisto AM, et al. (2020) Lifestyle-related risk factors among patients with coronary artery disease in Nepal. Scandinavian Journal of Caring Sciences 34(3): 782-791.

56. Kvarnström K, Airaksinen M, Liira H (2018) Barriers and facilitators to medication adherence: a qualitative study with general practitioners. BMJ Open 8(1): e015332.

57. Aynalem GA, Bekele TA, Berhe TT, Endazenew G (2021) Factors affecting adherence to lifestyle modification among patients with hypertension at Yekatit 12 Hospital Medical College, Addis Ababa, Ethiopia, 2019. SAGE Open Medicine 9.

58. Yang YL, Leu HB, Yin WH, Tseng WT, Wu YW, et al. (2021) Adherence to healthy lifestyle improved clinical outcomes in coronary artery disease patients after coronary intervention. Journal of the Chinese Medical Association 84(6): 596-605.

59. Doughty KN, Pilar NXD, Audette A, Katz DL (2017) Lifestyle Medicine and the Management of Cardiovascular Disease. Current Cardiology Reports 19(11): 116.

60. Nallamothu BK, Tommaso CL, Anderson HV, Anderson JL, Watts B (2014) ACC/AHA/SCAI/AMA-Convened PCPI/NCQA 2013 Performance Measures for Adults Undergoing Percutaneous Coronary Intervention: A Report of the American College of Cardiology/ American Heart Association Task Force on Performance Measures, the Society for Cardiovascular Angiography and Interventions, the American Medical Association-Convened Physician Consortium for Performance Improvement, and the National Committee for Quality Assurance. Circulation 129(8): 926-949.

61. Anurag A, Shilpa M, Arshitha A (2021) Assessment of Adherence to Therapeutic Regimen and Lifestyle Modification among Patients with Cardiovascular Disease. Annals of Community Health 9(1): 244-247.

62. Rapelli G, Donato S, Parise M, Pagani AF, Castelnuovo G, et al. (2022) Yes, I can (with you)! Dyadic coping and self-management outcomes in cardiovascular disease: The mediating role of health self-efficacy. Health Soc Care Community 30(5): e2604-e2617.

63. Martin N, Bergs J (2020) Patient flow data registration: A key barrier to the data-driven and proactive management of an emergency department. International Emergency Nursing 53: 100932.

64. Colombo C, Moja L, Gonzalez LM, Liberati A, Mosconi P (2021) Patient empowerment as a component of health system reforms: rights, benefits and vested interests.

Intern Emerg Med 53: 102-106.

65. EPF (2015) EPF Background Brief: Patient Empowerment: Patient Empowerment, European Patients Forum.

66. WHO (2012) First European Conference on Patient Empowerment - living with chronic disease, World Health Organization.

67. Coulter A, Magee H (2003) The European Patient of The Future. McGraw-Hill Education (UK).

68. Glassburn S, McGuire LE, Lay K (2019) Reflection as self-care: models for facilitative supervision. Reflective Practice 20(6): 692-704.

69. Wang Y, Xian Y, Chen T, Zhao Y, Yang J, et al. (2020) Effect of Lifestyle Changes after Percutaneous Coronary Intervention on Revascularization. Biomedical Research International 2020: 2479652.

70. WHO (2022) Health Promotion, World Health Organization.

71. Chahardah C, Gheibizadeh M, Jahani S, Cheraghian B (2018) The Relationship between Health Literacy and Health Promoting Behaviors in Patients with Type 2 Diabetes. Int J Community Based Nurs Midwifery 6(1): 65-75.

72. Raei M, Ghasemi M, Hushmandi K, Shirmohammadi KN, Omolbanin SS, et al. (2022) Effectiveness of Family-Centered Empowerment Model on Psychological Improvement of Patients with Myocardial Infarction: A Bayesian Multivariate Approach. Front Public Health 10: 878259.

73. Duncan S, Goodyear SF, McPhee J, Zinn C, Grontved A, et al. (2016) Family-centered brief intervention for reducing obesity and cardiovascular disease risk: A randomized controlled trial. Obesity 24(11): 2311-2318.

74. Goldfarb MJ, Bechtel C, Capers Q, de Velasco A, Dodson JA, et al. (2022) Engaging Families in Adult Cardiovascular Care: A Scientific Statement from the American Heart Association. Journal of the American Heart Association 11(10): e025859.