Sys Rev Pharm 2020;11(12):2422-2429
A multifaceted review journal in the field of pharmacy

Dietary Rehabilitation Effectiveness On Coronary Artery Diseases Patient's Outcomes

Masouda Hassan Abd El-Hamid Atrous[1,2], Hassnaa Eid Shaban Mosa[1] , Nouf Abdullah Alroqaiba [3], Hanady Sh. Shehata[4] Rania M Maher Alhalawany[5] & Sabah E. Nady [4].

[1] Nursing Department, College of Applied Medical Sciences, Jouf University , KSA.
[2] Critical Care and Emergency Nursing Department, Faculty of Nursing, University of Alexandria, Egypt.
[3] Assisstant professor of clinical nutrition in health and rehabilitation sciences College, Princess Norah Bint Abdulrahman University.
[4] Family and Community Health Nursing, Faculty of Nursing, Menoufia University, Egypt.
[5] Assisstant professor in health and rehabilitation sciences College, Princess Norah Bint Abdulrahman University.
Corresponding Author: Hassnaa Eid Shaban Mosa. E-mail: baajlaan@gmail.com.

ABSTRACT

Background: Heart disease (Coronary artery disease) is a major health problem and is behind so many other causes of death throughout the world. Cardiac rehabilitation is designed to optimize an early intervention for heart disease. It was reported that participation in cardiac rehabilitation is associated with about 20% lower cardiovascular mortality and morbidity. Aim of this study was to determine the impact of dietary modification teaching program on the compliance and recovery outcomes of patients with coronary artery diseases. Methods: The study was conducted at the cardiac care unit and the cardiac outpatients.Clinics at Menofia University and Shebien El- koom teaching hospitals. A deliberately chosen sample of 60 adult patients with coronary artery dysfunction was divided into two equal groups. All patients in both groups were assessed to collect the baseline data using the designed tools. Patients in the study group received a dietary modification teaching program including oral instructions supported with booklet and demonstration. Three sessions were given to each patient; each for at least 45 minutes. Patients in the control group follow the routine hospital care without any interference from researchers. Patients in both groups were reevaluated after two- and three-months post-discharge for nutritional status, cardiac manifestation, and compliance. Results: The consumption of total calories, fats, cholesterol and sodium were significantly lowered among study than the control group. The cardiac, respiratory, integument, gastrointestinal and neurological manifestations significantly improved in the study group more than in the control group. Conclusion: The recovery outcomes were improved among coronary artery disease's patients who received the dietary modification teaching program than those who exposed only to routine hospital care. Recommendation: Supervised dietary modification teaching program should be carried out for patient's in the outpatients clinics to improve their dietary compliance and recovery outcomes.

Keywords: Coronary arterydiseases, dietary modification, recovery outcomes, and teaching program.

Correspondence:
Hassnaa Eid Shaban Mosa
Nursing Department, College of Applied Medical Sciences, Jouf University , KSA.

*Corresponding author: Hassnaa Eid Shaban Mosa email-address: .baajlaan@gmail.com

INTRODUCTION

Coronary artery disease (CAD) is among the most common health conditions globally with about 422 million prevalent cases in 2015 (Kabboul et al., 2018C). CAD is related to higher morbidity and mortality and is a top cause of death worldwide. (Wu et al., 2019, Benjamin 2017, WHO Fact Sheet 2017). However, as the most prevalent cause of death in adults over the age of 35, CAD is an important public health problem (Boban et al., 2019, Shudifat et al., 2017).

CAD can be prevented with medical treatment and lifestyle changes and It is recommended to the patient to avoid smoking, eat a healthy diet, and have more physical activity.. The beneficial effects of a healthy diet on preventing cardiovascular disease have been seen and are empirically supported (Dehghan et al., 2012. Iqbal et al., 2008, Micha et al., 2017 and Hu et al.,2000). In recent years, food-based dietary patterns have been emphasized as an important aspect of dietary guidelines by various governments. (Santo et al, 2018). Cardiac rehabilitation (CR) program is designed to optimize the secondary prevention of coronary artery disease. It is known that CR has a beneficial impact on cardiovascular mortality and morbidity (Kabboul et al., 2018). In the 1960s, cardiac rehabilitation programs emerged as an effective way to help people get well. Now, primary prevention has become the priority of action for patients with CAD. Smoking cessation, diet and PA have had a significant impact on the process of heart disease prevention. In actuality, cardiac rehabilitation programs and secondary prevention programs have been demonstrated to be successful when both skills and medication are included (Cole et al., 2011. The most important element of a complete cardiac rehabilitation program is cardiovascular nutrition. According to the latest available data from the World Health Organization (WHO), hypertension, hyperglycemia, obesity and hypercholesterolemia are 4 of the 10 biggest risk factors for all-cause mortality all over the world. They highlight the importance of nutrition for an individual's health (Lacroix et al., 2017). The difficulties in finding a healthy diet remain universal. Despite its impressive benefits, confusion surrounding nutritional guidance sometimes arises because of the rapid advances in dietary and nutrition science. Multidisciplinary teams, including nutritionists, could help individuals improve lifestyle modification. Awareness of the risk factors and stages of the process is a vital step in modifying lifestyle behaviours (Kitakata et al., 2018). Patients should be advised to eat a Mediterranean style diet comprising high-fibre foods, such as fruit, vegetables, and fish (Cole et al.,2011). It is necessary to sustain the consumption of fruits and vegetables, as these elements have been accompanying by lowering the risk of atherosclerosis and

cardiovascular disease mortality. A reduction in vegetable and fruit consumption of 600 grams per day is associated with a 31 per cent decrease in cardiovascular disease. Also, fish consumption reduces the risk of death from a heart attack. Consumption of a high-sodium and high-fat diet is associated with increased risk of cardiovascular disease. A healthy diet consists of plenty of vegetables, fruits, and fish, as well as the consumption of unsaturated fats (Lacroix et al., 2017). One of the primary focuses of medical research over the past ten years has been to study all aspects of cardiac arrest before the arrival of emergency services. When combined with other unhealthy lifestyle factors (such as smoking, obesity, and inactivity), and type 2 diabetes is rampant in the Middle East (Shudifat et al., 2017). Therefore, the current study was divided into two parts, this first to measure the impact of dietary modifications on compliance and progress of patients with coronary artery disease, the second to determine the effectiveness of the dietary modifications teaching program in the treatment of this disease.

METHODS

Research Design and Setting: Quasi-experimental research design was utilized to conduct this study at the cardiac care unit and the cardiac out patient's clinics at Menofia University and Shebien El- koom teaching hospitals.

Participants: A purposive sample of 60 adult patients with coronary artery diseases aged between 22 to 54 years old, and able to communicate was included in the study and selected based on the power of 80 %. The required sample size was determined using Epi info software. Patients were assigned randomly into two equal groups, 30 patients for a study group and 30 for the control group.

Tools: Four tools were utilized for data collection in this study. The tool I was the Coronary artery disease's interviewing sheet. It was developed by the researcher after a literature review (National Nutrient Database for Standard Reference 2000, Smeltzer et al.,2017) and it is comprised of two parts. Part one comprised of six questions about socio-demographic characteristics as patient's age, sex, level of education, marital status, occupation, residence. Part two comprised of questions about patient's diagnosis, the number of smoked cigarettes per day, alcohol abuse, performed exercises and positive family history.

Tool II: Adopted from the **National Nutrient Database for Standard Reference (2000)** to evaluate the nutritional status of the participants and it has consisted of three parts. Part one was the 24 hours dietary recall for three consecutive days. The analysis of these eaten selected nutrients was identified by a nutritional specialist. Part two was the anthropometric measurements (including weight, height to calculate the body mass index). Part three was the laboratory investigations, including cardiac enzymes (such as troponin I and creatine kinase of cardiac cells), total cholesterol, low-density lipoprotein, high-density lipoprotein and triglyceride. **Tool III was the cardiac manifestation assessment sheet:** It was developed by the researcher after literature review (National Nutrient Database for Standard Reference 2000,Smeltzer et al.,2017) and it consisted of four questions about patient's complains of dyspnea, edema of the lower limb, neck veins distension and chest pain. In addition, to blood pressure measurements and electrocardiogram results. **Tool IV was the compliance assessment sheet.** It was comprised of three questions about patient's response to given instructions about cessation or at least a reduction of alcohol consumption and smoking and also patient's treatment compliance. All tools were tested for its **content validity** by three experts in the field of Medical-Surgical and community Nursing and two experts in the field of Cardiology, Alexandria University. Modifications were done accordingly. Test-retest was used to ascertain the **reliability** of the developed tools, the period between each test was 2 weeks and the patients who participate in the test were excluded from the sample. The reliability of tool one was 0.89, tool two was 0.92, tool three was 0.89 and tool four was 0.90. Before data collection, a **pilot study** was conducted on six patients (10%) to test the clarity and the applicability of the developed tools. The necessary modifications were done accordingly. Data obtained from those subjects were not included in the final study.

Intervention and Data Collection

Patients were selected according to the inclusion and exclusion criteria and divided alternatively into two equal groups, thirty patients in each group. After admission when the patient is hemodynamic stability; all patients in both groups was assessed to collect the baseline data for sociodemographic characteristics (using tool I part one and two), nutritional status (using tool II), cardiac manifestations (using tool III), and compliance. Patients in the control group follow the routine hospital care without any interference from researchers. Patients in the study group received an illustrative structured colored booklet that includes information about definition, pathophysiology, risk factors, manifestations, prevention and different treatment modalities of the disease. Also, it had information about nutritional, exercises and behavioural rehabilitation of the disease. The booklet was written in simple Arabic language, supported by illustrative images, and was reviewed by experts in the fields of medical surgery, critical care nursing and cardiology to assess the relevance, clarity and feasibility of the content. The dietary modification teaching program was carried out for each patient in the study group in cardiac care units and cardiac out-patient clinics. Oral instructions supported with booklet was used to introduce the theoretical part while demonstration and redemonstration method was used for the practical components of the program. Three sessions were given to each patient; each for at least 45 minutes. **First session:** Post hemodynamic stability, each patient received an individualized and comprehensive knowledge about the disease's definition, risk factors, clinical manifestations, complications, prevention and different treatment modalities. **Second session:** Nutritional counselling was done for each patient. The allowed and prohibited food was explained to them (limiting cholesterol and fats, using skimmed protein sources, taking plenty of fresh vegetables and fiber, using whole grains products, decreasing overall sodium in food and drinks and limiting total calories intake). **The third session:** Was used for teaching lifestyle modifications such as smoking cessation, monitoring hypertension and hypercholesterolemia, stress reduction and coping mechanisms (such as breathing exercises), and the importance of periodical checkup and medication. At the

beginning of each session, the researcher discussed the previous instruction. Then, he/she continued the new instruction. Each patient was given the authorisation to ask any questions and was encouraged to be fully compliant with the prescribed treatment. After discharge, each patient was called to make sure they did what they were supposed to and to perform a follow-up in the emergency room. Patients in both groups (study and control groups) were reevaluated after two and three months post-discharge for nutritional status using tool II, cardiac manifestation using tool III, and compliance using tool IV. Final responses were compared with the baseline responses that were obtained immediately on admission.

Ethical considerations

An explanation of the purpose of the study was given, and then a written approval to collect data was obtained from the hospital directors, medical coordinators, and head of the cardiology out-patient clinics and intensive cardiac units. The permission of the patients was obtained via a polite explanation that the purpose of the research would be to find a medicine that could treat cancer. The researcher first introduced him/herself to all subjects explained the purpose of the study and reassured them that any information obtained would be kept confidential and used only for the study. The researcher emphasized that there is no requirement to participate in the study. Participants are guaranteed anonymity with the use of code numbers for each patient. When subjects were asked to participate in the experiment, they were told that their participation would not affect their care.

Statistical analysis

The collected data were tabulated and analyzed using SPSS version 22. Descriptive statistics with percentage (%), mean (x)and standard deviation (SD) was used. Analytic statistics such as Chi-square test ($\chi 2$) was used to study the association between two qualitative variables; Fischer exact test for 2 x 2 tables when expected cell count of more than 25% of cases was less than 5; t-test was used for comparison between two groups normally distributed having quantitative variables; Mann-Whitney test (nonparametric test) was used for comparison between two groups not normally distributed having quantitative variables; and the Z test was used for comparing two proportions. A P-value of < 0.05 was considered statistically significant

RESULTS

The mean age of participants in the study group was 51.87±4.93 years and 53.67±3.78 years for participants in the control group. There were no statistically significant differences between both groups related to all socio-demographic characteristics. Similarly, there were no significant differences between the study group and control group concerning the medical diagnosis, family history, smoking, and the number of cigarette per day, as shown in **table 1.**

The pre-teaching program there were no statistically significant differences between both groups concerning the nutrients consumed per day. Post-teaching program, the dietary compliance (calories, fat, cholesterol, and sodium intake) of the participant in the study group was significantly better than that of participants in the control group. Participants show no significant differences between both groups in relation to their body mass index and lipid profile in the pre-teaching program phase. Post-teaching program, the differences in body mass index and lipid profile were significant between participants in the study group and participants in a control group, as shown in **table 2**.

Table (1): Socio-demographic characteristics and medical dataof both groups

Items	Study group N =30		Control group N =30		test	p-value
	No.	%	No.	%		
Age (Mean ± SD)	51.87±4.93		53.67±3.78		1.59†	>0.05
Sex						
Men	17	56.7	17	56.7	0.0‡	>0.05
Women	13	43.3	13	43.3		
Teaching						
Basic & below	17	56.7	20	66.7	0.74‡	>0.05
Secondary	6	20	4	13.3		
University and above	7	23.3	6	20		
Marital status						
Married	24	80	24	80	0.34‡	>0.05
Not married	6	20	6	20		
Occupation						
Occupied	21	70	20	66.7	1.18‡	>0.05
Not / house work	9	30.0	10	33.3		
Residence						
Urban	13	43.3	15	50.0	0.27‡	>0.05
Rural	17	56.7	15	50.0		
Diagnosis						
Unstable angina	18	60.0	16	53.3	0.27‡	>0.05

MI	12	40.0	14	46.7		
Family history[*]						
MI	25	83.4	24	80.0	0.01*	>0.05
Obesity	15	50.0	16	53.1	0.01*	>0.05
Hypercholesterolemia	16	53.3	17	56.7	0.02*	>0.05
Hypertension	28	93.3	28	93.2	0.00*	>0.05
Smoking						
Yes	13	43.3	11	36.7	0.28‡	>0.05
No	17	56.7	19	63.3		
arette number (mean ± SD)	11.83±16.42		12.67±19.11		0.14**	>0.05

(†) T test, (‡) X^2 test, (*) Z test, (**) Mann-Whitney test,
(*)Some subjects choose more than one choice

Table (2): Effect of dietary teaching program on patients' dietary compliance,body mass index (BMI), and lipid profile

Selected Nutrients	Study group	Control group	t-test	p-value
	Mean ± SD	Mean ± SD		
Total calories intake (kcal)				
Pre-teaching program	1843.2±307.51	1829.43±285.73	0.18	>0.05
Post-teaching program	1636.5±287.38	1798.87±284.78	2.2	< 0.05*
Total fat intake (gm)				
Pre-teaching program	63.36±19.23	66.9±22.15	0.66	>0.05
Post-teaching program	46.33±11.28	59.81±18.63	3.39	<0.05*
Cholesterol intake (mg)				
Pre-teaching program	237.48±84.72	239.52±77.85	0.10	>0.05
Post-teaching program	162.06±43.27	213.04±65.57	3.55	<0.05*
Sodium intake (mg)				
Pre-teaching program	2672.26±632.47	2486.68±598.30	1.17	>0.05
Post-teaching program	1900.28±423.43	2148.59±507.94	2.05	<0.05*
Low-density lipoprotein (LDL) cholesterol (mg/dl)				
Pre-teaching program	135.87±34.64	143.0±19.18	0.99	>0.05
Post-teaching program	116.0±30.24	137.2±27.5	2.64	<0.05*
High-density lipoprotein (HDL) cholesterol (mg/dl)				
Pre-teaching program	42.73±13.02	38.0±9.97	1.58	>0.05
Post-teaching program	47.4±11.39	40.03±8.5	2.84	<0.05*
Triglyceride (mg/dl)				
Pre-teaching program	200.73±94.89	211.23±101.95	0.32†	>0.05
Post-teaching program	181.77±41.39	208.63±57.18	2.09	<0.05*
Total cholesterol (mg/dl)				
Pre-teaching program	180.63±54.88	179.76±55.65	0.06	>0.05
Post-teaching program	168.72±31.15	213.04±65.57	3.34	<0.05*

(*) Significant results

Table (3)cleared that, there were no statistically significant differences between both groups before teaching but post teaching by two and three months, improvements appeared in the study group than the control group with statistically significant differences in all signs and symptoms except chest pain at the third month.

Table (3): Effect of dietary teaching program on the selected cardiac outcomes

Selected Outcomes	Pre teaching program		2 months post teaching program		3 months post teaching program	
	Study n(%)	Control n(%)	Study n(%)	Control n(%)	Study n(%)	Control n(%)
Chest pain						
No	0 (00)	0 (00)	0 (00)	0 (00)	1 (3.3)	3 (10.0)
Only with effort	0 (00)	1 (3.3)	30 (100)	30 (100)	29 (96.7)	27 (90.0)
All time	30 (100)	29 (96.7)	0 (00)	0 (00)	0 (00)	0 (00)
X^2	1.02		0		1.07	
p-value	>0.05		0		>0.05	
Lower limb edema						
No	12 (40.0)	6 (20.0)	7 (23.3)	0 (00)	27 (90.0)	21 (70.0)
To some extent	18 (60.0)	24 (80.0)	6 (20.0)	12 (40.0)	3 (10.0)	9 (30.0)

(edema grade 1)						
Yes (edema grade 2 to 4)	0 (00)	0 (00)	17 (56.7)	18 (60.0)	0 (00)	0 (00)
X^2	2.85		9.02		3.75	
p-value	>0.05		<0.05**		<0.05**	
Neck vein distension						
No	5 (16.7)	1 (3.3)	19 (63.4)	9 (30.0)	29 (96.7)	15 (50.0)
With sever effort	18 (60.0)	19 (63.4)	11 (36.7)	21 (70.0)	1 (3.3)	15 (50.0)
Always	7 (23.3)	10 (33.3)	0 (00)	0 (00)	0 (00)	0 (00)
X^2	3.22		60.7		16.7	
p-value	>0.05		<0.05**		<0.001**	

(*) Fischer exact test (**) Significant results

DISCUSSION

The impact of cardiovascular disease (CVD) on patients and their health agencies around the world can be very concerning. Apart from this, many of these circulatory diseases, such as myocardial infarction and stroke, cause death more than any other disease. There are many risk factors, that can be modified and consequently, prevention and controlling the disease progression that can happen (Smeltzer et al., 2008). The higher mortality rate of atherosclerotic coronary artery disease (CAD) necessitates the identification and control of the risk factors. (Schliemann et al., 2019). Cardiac rehabilitation aims to restore patient's life who suffered from myocardial infarction and maintain their optimal health. A comprehensive cardiac rehabilitation includes smoking cessation advice, dietary instructions, obesity reduction and stress management counselling as well as exercise performance (Jiao et al 2019).

The current study revealed that the mean age for the study and control group was 51.87±4.93 and 53.67±3.78 years respectively. This resembles the cross-sectional study of Lunder et al., (2019) which observed that most of the studied cases of ischemic heart disease were in the age group from 45 to 64 years. This study shows that ischemic heart disease is prevalent in the elderly population and a high percentage of inactive lifestyle is a known risk factor for the development of ischemic heart disease. Regarding the patients'sex, the current study found that more than half of both groups were male. This was in line with National Lung, Heart and Blood Institute (2012) which reported that the men are generally at greater risk for ischemic heart disease than women. But the National centre for health statistics (2010) illustrated that ischemic heart disease affects women more than men. This is maybe related to the fact that the mean diameters of coronary arteries were significantly smaller in female than in males. This difference persisted even after the diameter was corrected for heart weight and body surface area.Regard occupation and marital status, the present study found that less than half of both groups were mentally worked and the majority of them were married. This was in line with Peter and Siegrist (2002) who stated that chronic life stresses that include mental work stress and marital stress are usually ending with ischemic heart diseases. AlsoGoweyet al., (2019)reported that mental job strains have been linked to more rapid progression of carotid atherosclerosis and risk of ischemic heart disease. In relation to the standard of living, education and residence of subjects, the present study revealed that predominantly about half of both groups had seen as having low socioeconomic status and lived in the rural area and about one third were educated. These results were consistent with (Knighton et al., 2018)who said that low socioeconomic status is associated with adverse health outcomes especially the risk for ischemic heart diseases. Also, lower socioeconomic status is usually accompanied with living in the rural area and low educational status and there is a predicted increased risk of myocardial infarction in large categories of these patients with significant, angiographically defined ischemic heart disease at baseline. These studies supported the idea that socioeconomic status related morbidity and mortality involve complex combinations of factors as low economic, educational, psychological, social and rural residential status. Concerning family history, the current study revealed that most patients of both groups had a positive family history of myocardial infarction and hypertension. While about half of them had a positive family history of obesity and hypercholesterolemia. Similarly, Kazemi et al. (2018) found that family history of heart attack/myocardial infarction is associated with a higher risk to develop the ischemic heart disease, especially with the first-degree relative that is developed it at an early age. It is also a powerful marker of risk for the development and accelerated progress of the disease. They reported that participants with a positive family history for ischemic heart disease tended to have a worse family history risk factor profile that included hyperlipidemia, hypertension, and obesity. Regarding smoking, the present study showed that more than one-third of both groups were smokers. Similarly, Kalkhoran et al. (2018) stated that smoking is a known risk factor for ischemic heart disease. Also, the greater the number of smoked cigarette per day, the more incidence of ischemic heart diseases. For women who have smoked at least 20 cigarettes a day, the risk of heart attack is six times as great as that of a woman who has never smoked. For male smokers, the incidence of pneumonia is tripled compared to nonsmokers.From this study's findings, it was found that approximately one-third of both groups, were cigarette smokers. Similarly, Kalkhoran et al. (2018) stated that smoking is a known risk factor for ischemic heart disease. Converting to smoking may signal a higher risk of heart attack and thus creates more risk of one dying due to ischemic heart disease. For women who have smoked at least 20 cigarettes a day for the past 20 years, the risk of heart attack is six times the risk a woman who has never smoked.Also, Oldridge et al., 2019 indicated that patients who were participating in structured cardiac rehabilitation program reported a significant decrease in dietary total calories, fat, cholesterol and sodium intake after six months compared with a control group receiving usual care. This is maybe related to the disease's nutritional teaching module of the rehabilitative program. This is similar to the result of the present study which revealed that the intake of total calories; fats and sodium were statistically decreased among study group than control group post teaching.Ferdinand et al., (2019)stated that bodyweight has a significant effect on developing ischemic heart disease especially overweight in which body mass index

is 25–30kg/m2 and obesity in which body mass index is more than 30kgs/m2 that are considered risk factors. The present study revealed that before teaching both groups were obese as stated by their body mass index. Also, Lunder et al., (2019) result which shown that about half of the patients had increased body mass index as the most frequent factor associated with ischemic heart disease. From the researcher point of view, this may be probably because of sedentary lifestyle without optimal exercise for most patients. Moreover, Debray et al., (2017) added that obesity is a vigorous predictor for ischemic heart diseases as observed in the Framingham heart study which found that obese group experienced twice the risk of disease than non-obese group after adjusting for the influences of other major risk factors.The finding of the present study shown that the mean of body mass index was statistically decreased among study group than control group post teaching. From the researcher point of view, this is maybe related to nutritional and exercises instructions of the given rehabilitative teaching program. This carried the same meaning of Baccouche et al., (2018) results which stated that comprehensive cardiac rehabilitation program lowered ischemic heart disease obesity risk factor, while exercise alone without concomitant dietary caloric restriction and behaviour modification tend to produce an only modest weight loss of 2 Kg. However in a randomized trial that was made by Ronald et al., (2006)stated that a comprehensive cardiac rehabilitation program including high aerobic exercises lead to at least as much fat loss as the equivalent degree of caloric restriction with improvements in blood pressure, cholesterol and triglyceride level.In relation to laboratory findings, the present study illustrated that, low-density lipoprotein; total cholesterol and triglyceride post teaching by three months were statistically decreased among study group than among control group, while high-density lipoprotein was statistically elevated in the study group than the control group. Research shows that extreme forms of physical exercise can decrease high cholesterol, decrease levels of low-density lipoproteins in the blood and increase levels of high-density lipoproteins in the bloodstream. This is consistent with Dotinga (2011), who reported that exercise training will promote the development of a healthier attitude towards physical activity and health.. This is also in agreement with Chaves et al., (2015) in their prospective study, who reported that the proportion of patients with high levels of triglycerides and LDL cholesterol improved in their educational program These results suggest that comprehensive cardiac rehabilitation programs would beneficially alter lipids and patient's prognosis when appropriately performed. From the researcher point of view, this is maybe related to a patient's compliance with nutritional counselling.Regarding physical assessment outcomes, the present study revealed that most of cardiac, respiratory, manifestations were improved in study group than control group post teaching by two and three months. This resemble the study of Nair et al., (2018)(37)who reported that, in one report of the comprehensive cardiac rehabilitation program, including exercise, half of waiting elective coronary artery bypass graft surgery's patients whose experiencing severe disease's manifestations as anginal chest pain and dyspnea were removed from the waiting list following abatement of their anginal chest pain and dyspnea. Also, their functional status improved after reduction in restlessness, confusion and anxiety manifestations. Moreover, patients returned to their premorbid lifestyle. From the researcher point of view, this is maybe related to improvements in laboratory findings, reduction of body weight and cessation of smoking among almost all of study group patients.This is compatible with Chaves et al., (2015), who observed that a simple educational program improves obesity symptoms, modifiable cardiovascular risk factors, and the current number of smokers in an unselected outpatient population.The current study reported that there was a significant positive correlation between almost all laboratory findings and nutritional analysis results of the study group after three months of post teaching. This was in line with the cross-sectional study of Sikandet al.,(2018) they investigated the relationship between nutritional counselling and reducing serum lipid profile. The study findings revealed that after three months of intervention a significant reduction of cholesterol, high-density lipoprotein as well as a triglyceride.On the other hand, three randomized controlled trials have shown that there was no benefit in terms of reduction in the rate of return to smoking through education and counselling alone. This discrepancy may be due to the fact of, in addition to counselling and education, improving smoking habit should including patients support and attention to behavioural change and maintenance of change, in addition to exercise training (Graham et al., 2019).

A report shows that when chemical, pharmaceutical or behavioral treatment is used upon a patient population over a long period, it has a significant effect on lowering cholesterol. It appears that many patients will need pharmaceutical therapy to work off dietary and/or exercise-related goals to achieve the right level of lipid levels in the blood. the results of studies examining the safety and efficacy of supplements have not yielded a high success rate of improving HDL cholesterol and lowering LDL cholesterol completely without using statin drug (Shaw, 2014; Iyer et al., 2019)

CONCLUSIONS

Based on the results of this study, it can be concluded that: The means of total calories, fats, and cholesterol and sodium intake were lowered among the study group than the control group after three months of post-teaching. Cardiac, respiratory, manifestations of ischemic heart disease improved among study group than control group post teaching.

Recommendations

Based on the findings of the present study the following recommendations are derived and suggested that supervised dietary modification teaching program should be carried out for patients in the outpatient clinics to improve their recovery outcomes. Booklets about appropriate diets, and other life styles modifications should be distributed among all patients with ischemic heart disease before their discharge from the hospital.

REFERENCES

1. Kabboul NN, Tomlinson G, Francis TA, Grace SL, Chaves G, Rac V, Daou-Kabboul T, Bielecki JM, Alter DA, Krahn M. Comparative effectiveness of the core components of cardiac rehabilitation on mortality and morbidity: A systematic review and network meta-analysis. Journal of clinical medicine. 2018; 7(12):514.
2. Wu J,, Leu H , Yin W, Tseng W, Wu Y,Lin Tet al. The benefit of secondary prevention with oat fiber inreducing future cardiovascular event among CAD patients after coronary intervention. Scientific Reports. 2019; 9: 3091 https://doi.org/10.1038/s41598-019-39310-2

3. Benjamin EJ, Blaha MJ, Chiuve SE, Cushman M, Das SR, Deo R, de Ferranti SD, Floyd J, Fornage M, Gillespie C, et al. Heart disease and stroke Statistics-2017 update: a report from the American Heart Association. Circulation.2017; 135(10):e146–603.
4. WHO Fact Sheet N° 310: The top 10 causes of death. Geneva: World HealthOrganisation. 2017; [updated January 2017] ; http://www.who.
5. int/mediacentre/factsheets/fs310/en/ accessed 21 April 2017.
6. Kandaswamy E, Zuo L. Recent advances in treatment of coronary artery disease: role of science and technology. International journal of molecular sciences. 2018 Feb;19(2):424.
7. Cole JA, Smith SM, Hart N, Cupples ME. Systematic review of the effect of diet and exercise lifestyle interventions in the secondary prevention of coronary heart disease.Cardiology research and practice. 2011.
8. Boban M, Bulj N1, Zeljković M, Radeljić V, Krcmar T, Trbusic M et al. Nutritional Considerations of Cardiovascular Diseases and Treatments Nutrition and Metabolic Insights). 2019; (12): 1–9.
9. Shudifat A, Johannessen A , Azab M ,Al-Shdaifat A, AbuMweis S, Agraib L , TayyemR.Risk factors for coronary artery disease in patients undergoing elective coronary angiography in Jordan BMC Cardiovascular Disorders. 2017;17: 183.
10. Dehghan M, Mente A, Teo KK, Gao P, Sleight P, Dagenais G, Avezum A, Probstfield JL, Dans T, Yusuf S. Relationship between healthy diet and risk of cardiovascular disease among patients on drug therapies for secondary prevention: a prospective cohort study of 31 546 high-risk individuals from 40 countries. Circulation. 2012;126(23):2705–12.
11. Iqbal R, Anand S, Ounpuu S, Islam S, Zhang X, Rangarajan S, Chifamba J, Al-Hinai A, Keltai M, Yusuf S, et al. Dietary patterns and the risk of acute myocardial infarction in 52 countries: results of the INTERHEART study. Circulation. 2008; 118(19):1929–37.
12. Micha R, Penalvo JL, Cudhea F, Imamura F, Rehm CD, Mozaffarian D. Association between dietary factors and mortality from heart disease, stroke, and type 2 diabetes in the United States. JAMA. 2017; 317(9):912–24.
13. Hu FB, Rimm EB, Stampfer MJ, Ascherio A, Spiegelman D, Willett WC. Prospective study of major dietary patterns and risk of coronary heart disease in men.Am J ClinNutr. 2000; 72(4):912–21.
14. Santo K, Hyun K, de Keizer L, Thiagalingam A, Hillis GS, Chalmers J, Redfern J, Chow CK. The effects of a lifestyle-focused text-messaging intervention on adherence to dietary guideline recommendations in patients with coronary heart disease: an analysis of the TEXT ME study. International Journal of Behavioral Nutrition and Physical Activity. 2018; 15(1):45.
15. Lacroix S, Cantin J, Nigam A. Contemporary issues regarding nutrition in cardiovascular rehabilitation. Annals of physical and rehabilitation medicine. 2017 Jan 1; 60(1):36-42.
16. Kitakata H, Kohno T, Kohsaka S, Fujino J, Nakano N, Fukuoka R, Yuasa S, Maekawa Y, Fukuda K. Patient confidence regarding secondary lifestyle modification and knowledge of 'heart attack'symptoms following percutaneous revascularisation in Japan: a cross-sectional study. BMJ open. 2018; 8(3):e019119.
17. National Nutrient Database for Standard Reference. Dietary reference intakes: Vitamin A,K,arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium and zinc. 2000; http://119.93.23.123/resourcematerials/ACADEME/e20guide%20to20nutrient%20requrement.pdfAccessedjun22.2010.
18. Smeltzer S. and Bare B. Medical Surgical Nursing. 10th ed., New York. Lippincott company. 2008; 713.
19. Smeltzer S., Bare B., Hinkle J. and Cheever K. Coronary Artery Disease. Textbook of Medical Surgical Nursing, 11th ed ., New York, Lippincott Willims and Wilkins. 2007; 713-62.
20. Schliemann D, Woodside JV, Geaney F, Cardwell C, McKinley MC, Perry I. Do socio-demographic and anthropometric characteristics predict food choice motives in an Irish working population?.British Journal of Nutrition.2019; 13:1-22.
21. Jiao J, Liu G, Shin HJ, Hu FB, Rimm EB, Rexrode KM, Manson JE, Zong G, Sun Q. Dietary fats and mortality among patients with type 2 diabetes: analysis in two population based cohort studies. bmj. 2019 Jul 2; 366: l4009.
22. Lunder M, Janić M, Šabovič M. Prevention of vascular complications in diabetes mellitus patients: focus on the arterial wall. Current vascular pharmacology. 2019 Jan 1; 17(1):6-15.
23. National Lung, Heart, and Blood Institute. Coronary artery disease. Available at:http://www.nhlbi.nih.gov/health/dci/Diseases/Cad/CAD_WhatIs.html. 2012.
24. National Center for Health Statistics. Health data interactive: Final mortality data. Available at: http://www.cdc.gov/mchs/hdi.htm. 2010.
25. Peter R. and Siegrist J. Psychosocial work environment and the risk of coronary heart disease. IntArchOccup Environ Health. 2002; 73(1):S41-S5.
26. Gowey MA, Khodneva Y, Tison SE, Carson AP, Cherrington AL, Howard VJ, Safford MM, Dutton GR. Depressive symptoms, perceived stress, and metabolic health: the REGARDS study. International Journal of Obesity. 2019; 43(3):615-32.
27. Knighton AJ, Savitz LA, Benuzillo J, VanDerslice JA. It takes a village: Exploring the impact of social determinants on delivery system outcomes for heart failure patients. In Health care. 2018; 6(2): pp. 112-116.Elsevier.
28. Kazemi E, Jamialahmadi K, Avan A, Mirhafez SR, Mohiti J, Pirhoushiaran M, Hosseini N, Mohammadi A, Ferns GA, Pasdar A, Ghayour-Mobarhan M. Association of tumor necrosis factor-α-308 G/A gene polymorphism with coronary artery diseases: An evidence-based study. Journal of clinical laboratory analysis. 2018; 32(1):e22153.
29. Kalkhoran S, Benowitz NL, Rigotti NA. Reprint of Prevention and Treatment of Tobacco Use: JACC Health Promotion Series. Journal of the American College of Cardiology. 2018; 72(23):2964-79.
30. Devasia T, Shetty PN, Kareem H, Karkala YR, Singh A. Manipal lifestyle modification score to predict major adverse cardiac events in postcoronary angioplasty patients. Indian heart journal. 2018; 70:S353-8.
31. Oldridge N, Pakosh M, Grace SL. A systematic review of recent cardiac rehabilitation meta-analyses in patients with coronary heart disease or heart failure.Future cardiology. 2019.
32. Ferdinand KC, Samson R. Nonobstructive Coronary Artery Disease in Women: Risk Factors and Noninvasive Diagnostic Assessment. Cardiovascular Innovations and Applications. 2019 Feb 1; 3(4):349-61.
33. Debray TP, Damen JA, Snell KI, Ensor J, Hooft L, Reitsma JB, Riley RD, Moons KG. A guide to systematic review and

meta-analysis of prediction model performance.Bmj. 2017; 356:i6460.
34. Baccouche B, Benlarbi M, Barber AJ, Ben Chaouacha-Chekir R. Short-Term Administration of Astaxanthin Attenuates Retinal Changes in Diet-Induced Diabetic Psammomysobesus. Current eye research. 2018 ; 43(9):1177-89.
35. Ronald J., Glen P., Kenny P., David H., Carmen C. and Russell D. Physical activity/exercise and type 2 diabetes. Diabetes Care. 2006; 29 (6): 1433-8.
36. Dotinga R. Cardiac rehab may cut risk factors after mini Stroke. Surgical Care Affiliates. 2011; 2(9): 407-26.
37. Chaves G, Britez N, Munzinger J, Uhlmann L, Gonzalez G, Oviedo G, Chaparro V, Achon O, Bruckner T, Kieser M, Katus HA. Education to a healthy lifestyle improves symptoms and cardiovascular risk factors–AsuRiesgo Study. Arquivosbrasileiros de cardiologia. 2015; 104(5):347-55.
38. Nair VV, Nair JT, Das S, Singh KK, Kathayanat JT, Radhakrishnan R, Chooriyil N, Babu A. Lifestyle practices, health problems, and quality of life after coronary artery bypass grafting. Indian Journal of Thoracic and Cardiovascular Surgery. 2018; 34(4):476-82.
39. Sikand G, Cole RE, Handu D, deWaal D, Christaldi J, Johnson EQ, Arpino LM, Ekvall SM. Clinical and cost benefits of medical nutrition therapy by registered dietitian nutritionists for management of dyslipidemia: A systematic review and meta-analysis. Journal of clinical lipidology. 2018; 12(5):1113-22.
40. Graham HL, Lac A, Lee H, Benton MJ. Predicting Long-Term Mortality, Morbidity, and Survival Outcomes Following a Cardiac Event: A Cardiac Rehabilitation Study. Rehabilitation Process and Outcome. 2019; 8: 1179572719827610.
41. Shaw KA, Gennat HC, O'Rourke P, Del Mar C. Exercise for overweight or obesity. Cochrane database of systematic reviews.2006: (4).
42. Lyer P, Beck EJ, Walton KL. A systematic review of the effect of dietary interventions on cardiovascular disease risk in adults with spinal cord injury. The journal of spinal cord medicine. 2019; 3: 1-20.