

Patients with Coronary Artery Disease in the North of Jordan: Toward Healthy Lifestyle Intervention

Muayyad Ahmad^{1,*}, Loai Tawalbeh²

¹Clinical Nursing Department, Faculty of Nursing, the University of Jordan, Amman, Jordan

²Faculty of Nursing, Al-AlBait University, Al-Mafraq, Jordan

Email address

mma4jo@yahoo.com (M. Ahmad), twalbeh2005@yahoo.com (L. Tawalbeh)

To cite this article

Muayyad Ahmad, Loai Tawalbeh. Patients with Coronary Artery Disease in the North of Jordan: Toward Healthy Lifestyle Intervention. *International Journal of Public Health Research*. Vol. 3, No. 5, 2015, pp. 279-287.

Abstract

Coronary artery disease (CAD) is the primary leading cause of death in Jordan. Risk factors of CAD can be modified by improving knowledge and adherence to healthy lifestyle. The purpose of this study was to explore the educational intervention for patients with CAD at the north of Jordan toward healthy lifestyle. Pretest-posttest design was used. A convenience sample of 84 patients with coronary artery disease was recruited from the cardiac clinic in a large educational hospital in Jordan. Knowledge was measured using coronary heart disease knowledge and awareness questionnaire and adherence was measured using adherence scale. The results showed that the mean of knowledge was 8.7 and for adherence was 27.3 to healthy lifestyle among patients with CAD. Findings showed a significant improvement in the knowledge and adherence after implementing the educational program. Additionally, there was a strong correlation between the demographics of monthly income and educational level, and both knowledge and adherence to healthy lifestyle. On the other hand, a negative relationship was found between age and both knowledge and adherence to healthy lifestyle. Finally, the results revealed that females have less knowledge and adherence to healthy lifestyle than males.

Keywords

Coronary Artery Disease, Education, Intervention, Adherence, Knowledge, Arab Patients

1. Introduction

1.1. Background and Significance

Coronary artery disease (CAD) was responsible for 48% and 34% of men's and women's deaths respectively of (Cardiovascular disease) CVDs deaths in Jordan (MOH, 2007). Individuals who adjust CAD risk factors in a constructive direction can lower the risk for CAD (Shahnaz & Ahmad, 2015; Skinner, Cooper & Feder, 2007). Health information related to CAD is needed to adhere to healthy lifestyle and to achieve the modification of CAD risk factors (Kayaniyil, et al., 2009).

Lack of knowledge regarding one's disease can prevent possible lifestyle modifications and eventually cardiac health (Kayaniyil, et al., 2009). Evidently, it is vital to evaluate the level of CAD knowledge, adherence to healthy lifestyle and the effect of CAD educational program on the level of knowledge and adherence to healthy lifestyle among patients with CAD in the north of Jordan. Moreover, in the existing

health care system, there is inadequate time for nurses to teach and advice patients due to the shortened length of hospital stay (Buckley et al., 2007; Ahmad, 2010). Thus, patients have a difficulty to understand the importance of knowledge on disease and adherence to healthy lifestyle modification (Lauck, et al., 2009). Ultimately, empirical examination for the impact of CAD educational program on knowledge and adherence to healthy lifestyle is needed in the population of CAD in Jordan as well as other countries.

Many cardiac educational programs are designed to increase the level of knowledge about CAD among AMI patients that lead to better adherence to healthy lifestyle (Bellman, et al., 2009). Therefore, several researchers have supported the application of educational programs in serving people to adhere healthier lifestyles (Ahmad, 2014; Tawalbeh & Ahmad, 2014). Previous studies showed that providing cardiac health related information will enhance the subjects' knowledge about cardiac risk factors (Aldana, et al., 2005).

Effective patient education and management for patients with CAD may prevent recurring cardiac events and the

progression of CAD. Therefore, having knowledge regarding CAD risk factors is a vital factor to enhance patient's knowledge and adherence to healthy lifestyle. Although there are guidelines signifying the content of patient education among patients with CAD, there is a scarcity of studies evaluating the effect of such education in Jordan. Accordingly, it is vital to examine the connections between patient education and its outcomes in the area of improving patient knowledge and adherence to healthy lifestyle among patients with CAD in the north Jordan. The purpose of this study was to explore the educational intervention for patients with CAD in the north of Jordan toward healthy lifestyle.

1.2. Theoretical Framework

Orem's Self-care deficit nursing theory (SCDNT) was used to provide a guidance to investigate the concepts of patient education, knowledge and adherence to healthy lifestyle among patients with CAD in Jordan. Orem's SCDNT has a great significance for nurses; it has been used to define and describe the multiple roles for nurses in different settings. The clinical nurse specialist role, the case management role, the advanced practice role and the primary care role were documented and they have meaning through application of the theory (Marriner-Tomey & Alligood, 2006, P. 280). In addition, Orem's theory has a great significance in research and practice. In practice, it is well applied to many clinical situations including all age groups, specific gender, families, oncology issues and health promotion. There are many studies that were derived from Orem's theory in different areas. These studies focused on instrument development and new models and middle range theory development (Taylor, 2006).

Nursing literature had devoted much attention to the knowledge about CAD, the effect of cardiac educational program on knowledge and role of knowledge and educational program in promoting lifestyle modification and adherence to healthy lifestyle among patients with CAD. This chapter presents the review of the studies related to knowledge regarding CAD, the relationship between knowledge and adherence to healthy lifestyle and the effect of educational program on the knowledge and adherence to healthy lifestyle among patients with CAD. In addition, this chapter discusses the studies that are related to the relationship between demographical variables and both knowledge and adherence to healthy lifestyle among patients with CAD. Furthermore, the theoretical framework that guided the conduction of this study is presented.

Numerous studies were conducted to examine effect of an education and counseling on knowledge, attitudes and beliefs about CAD and adoption of healthy lifestyle among working adults (Eshah, et al., 2010; Alasad, Abu Tabr & Ahmad, 2015) and among patients with CAD (Buckley, et al., 2007; McKinley, et al., 2009). Buckley and colleagues and McKinley and colleagues conducted randomized controlled trials and found that the educational intervention improved the knowledge of patients with CAD.

The reviewed literature revealed that patients with CAD

may have some knowledge about CAD. But this level is underestimated and need more improvement. Knowledge about CAD affects many aspects of patient life. It may motivate the patient to perform the health activities and self-care activities and improve the adherence to healthy lifestyle. Knowledge is an important factor in improving the quality of life, decreasing readmission to the hospital and decreasing health care cost (Ahmad, Alasad, & Nawafleh, 2010). The literature indicated that, to enhance the knowledge regarding CAD, it is necessary to plan, conduct and provide an effective cardiac educational program that helps improve the knowledge level about CAD. In Jordan, there is a scarcity in the studies conducted to examine the effect of cardiac educational programs on the knowledge and adherence to healthy lifestyle among patients with CAD.

2. Methods

One group pretest-posttest design was conducted to examine the effect of the educational intervention for patients with CAD in the north of Jordan toward healthy lifestyle. This design included the manipulation of the independent variable in which the researcher provided an educational session for the participants of the study. Pretest-posttest design is the most widely used design by nurse researchers (Polit & Beck, 2014). This design involves the collection of data before and after the implementation of the interventional program (Polit & Beck). In addition, it involves measuring the dependent variables including patient knowledge and adherence to healthy lifestyle before and after the implementation of CAD educational program.

2.1. Ethical Considerations

The study was approved by the ethical committee at the University of Jordan-Faculty of Nursig and the IRB of the educational hospital in Irbid. Permissions from the participants were obtained regarding the conduction of the study, place where the interviews were conducted and the time of interviews. Written informed consent was obtained from all participants who agree to participate in the study. The participants received both oral and written information about the purpose; content and extent of the study. The confidentiality of participants was protected by providing code number for each participant at the stage of data collection and analysis. In addition, the collected questionnaires were kept in a locked cabinet to keep the participants information private and confidential. Participants' participation was completely voluntary and they assured that their responses will be confidential. The participants were informed that only aggregated data will be communicated to health care providers.

2.2. Procedure

The Schematic diagram presents the study protocol and data collection points (Figure 1). This scheme demonstrated the steps required to carry out the study. Also, it involved

measuring knowledge and adherence to healthy lifestyle using baseline data.

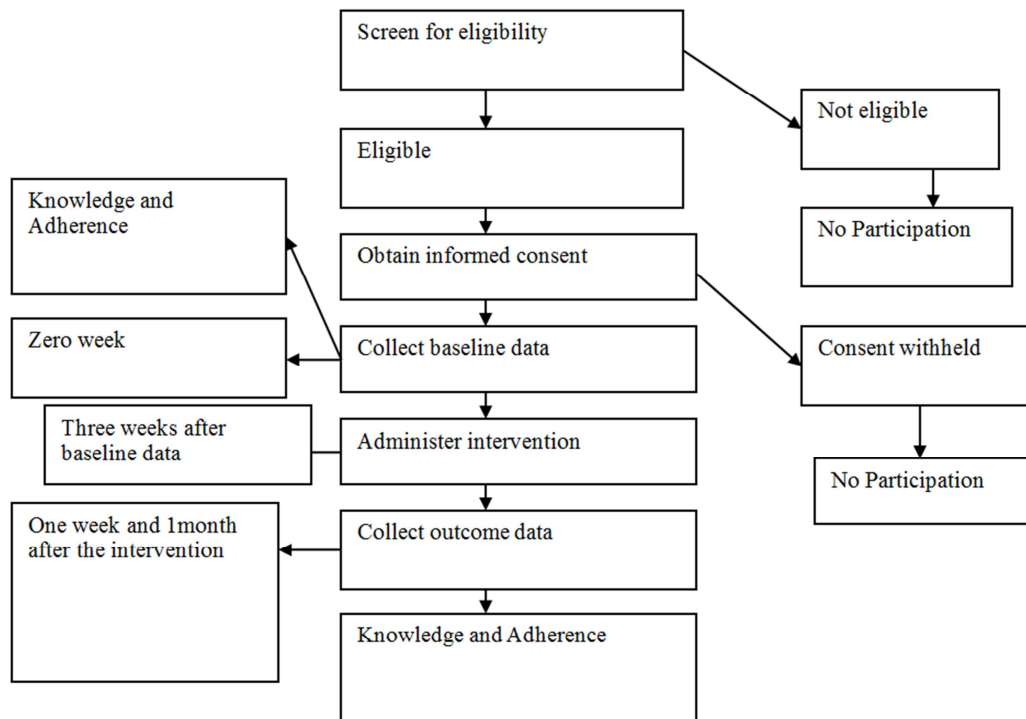


Figure 1. The study protocol and data collection process.

2.3. Study Sample

This study was conducted in an educational hospital in the second largest city in Jordan. A convenience sampling technique was used to recruit the participants with CAD including both patients with post AMI and patients with angina post cardiac intervention either stenting or percutaneous coronary intervention. The inclusion criteria for the participants in this study were (a) Mentally competent since cognitive impairment negatively affects the comprehension of the cardiac educational program content; (b) able to communicate verbally; (c) able to read and write Arabic language; (d) more than 18 years. Exclusion criterion included patients with life-threatening comorbidities. The sample size was determined according to a power level of 0.80, alpha of 0.05, and a medium effect size (0.30) for paired t-test. The sample size in this study was 102 participants.

2.4. Measures

Three parts of a structured questionnaire were utilized for collecting the data to achieve the purpose of the study. The questionnaire started with the demographics. The second part of the questionnaire is the CHD awareness and knowledge questionnaire (Cronbach's alpha ranged from 0.69 to 0.86) and the Coronary Heart Disease Knowledge Test (Smith, Hicks & Heyward, 1991) (Cronbach's alpha = 0.84). The third part is the adherence to healthy lifestyle scale. Items were tested for reliability in the current study and results revealed that Cronbach's alpha coefficient was 0.74.

2.5. Data Collection

An interview technique was used to elicit the necessary information from patients with CAD in the north of Jordan. The interview was structured using fixed response format. Structured interview is the interview in which the researcher carries out a maximum control by preestablishing fixed wording and sequence for all questions and usually preestablishing possible responses (Waltz, Strickland & Lenz, 2005). Data were collected before and after the implementation of the cardiac educational program. The informed consent was obtained from the participants. Then, the researcher collected the baseline data. Later, the researcher implemented the cardiac educational program. After that, the outcome data were collected in the cardiac clinic one week and one month after the implementation of the cardiac educational program. Constancy of conditions was achieved among all participants by delivering the same messages to all potential participants and adherence to the research protocol and procedure.

2.6. The Cardiac Educational Program

Patients require information that will help them become more knowledgeable and active participants in their own health care (Krouse, 2000). During the group educational session, the Active Partnership Program was presented by the researcher. "Active Partnership for the Health of your Heart" is an American Heart Association program (AHA, 2010). Also, the content of the program was drawn from relevant articles in the evidence-based literature (Balady, et al., 2007).

The cardiac educational program was reviewed by cardiologist to assess the content and the adequacy of the information that was provided for the participants in the study. In addition, the educational program was translated and backtranslated into Arabic language.

The teaching areas for patients with CAD included the following: anatomy and physiology of the heart, causes, symptoms and risk factors of CAD, healthy diet, physical activity, weight management, and risk factors management. Risk factors include hypertension, diabetes mellitus, obesity, cholesterol, stress and smoking. This program was implemented using open discussion with participants. Educational materials designed to provide information and enhance active participation in health care decision can be efficient tools for empowering patients (Ahmad & Al Nazly, 2014; Krouse, 2000; Ahmad, 2000). The participants were encouraged to involve their family members and the relatives to attend the educational session.

The educational program also included information about weight and obesity management. The definition of obesity, complications and ways of control it are addressed. Another part of the educational program is about hypertension management which includes the normal blood pressure, symptoms, complications and treatment. Additional parts about diabetes mellitus management the psychological factors were also included.

3. Results

A convenience sample of patients with CAD (N=102) from the cardiac clinic in educational hospital in the north of Jordan participated in this study. Eighty-four participants completed the second posttest indicated that the response rate was 83%. All the participants were reminded to attend the educational program, the first and the second posttest. The mean for patient's age was 53 years. More than half of the sample was males (N=47). The educational level of the participants was divided into four categories; less than second secondary class, second secondary class, diploma, baccalaureate and master or doctorate. None of the participants was in the category of master or doctorate and thus this category was deleted from the analysis. The results revealed that the participants were almost equally distributed in the four categories.

The results showed that the mean knowledge among

patients with CAD in the north of Jordan before the application of the cardiac educational program was 8.70 (SD=2.89) within the range of 3-13 score. The mean adherence to healthy lifestyle among patients with CAD in the north of Jordan before the application of the educational program was 27.30 (SD= 6.54) within the range of 16-41 score.

Repeated measures Analysis of Variance (Repeated measures ANOVA) tests were used to examine the effect of the cardiac educational program on the four subscales of the knowledge which included pathophysiology, risk factors, symptoms and treatment. The effect of the program on knowledge and adherence to healthy lifestyle was tested one week and one month after the program application. The statistical analysis was conducted using the final sample size (N=84) to have the same participants in the three stages of analysis; upon recruitment, one week after the application of the cardiac educational program and one month after the program application.

The results revealed that the mean knowledge scores before the application of the cardiac educational program was 8.70 (SD=2.94). The results showed that the mean knowledge scores differed significantly one week after the application of the program and after one month (M= 18.73; 19.24) respectively, $F = 17.08, P < 0.01$.

The results showed that the mean pathophysiology scores before the application of the cardiac educational program was 1.67 (SD=1.27). The results showed that the mean pathophysiology scores differed significantly one week after the application of the program and after one month (M= 4.62; 5.08) respectively, $F = 16.18, P < 0.01$.

The results revealed that the mean risk factors scores before the application of cardiac educational program was 2.30 (SD=1.80). The results showed no significant differences on the risk factors at one week and one month after the application of the program. Furthermore, the results revealed that the mean symptoms scores before the application of the cardiac educational program was 1.14 (SD=0.83). The results showed that the mean symptoms scores did not differed significantly one week after the application of the program. In addition, the results revealed that the mean symptoms scores did not differed significantly one month after the application of the cardiac educational program.

Table 1. Repeated measure Analysis of Variance for the effect of educational program on the level of knowledge and adherence to healthy lifestyle among patients with coronary artery disease in the north of Jordan.

Variable	One Week	One Month	F	Greenhouse-Geisser Type III Sum of Squares
	M (SD)	M (SD)		
Knowledge	18.73 (2.37)	19.24 (2.49)	17.08**	11.01
Pathophysiology	4.62 (1.06)	5.08 (1.13)	16.18**	9.05
Risk Factors	7.32 (1.20)	7.31 (1.38)	0.01	0.01
Symptoms	1.67 (0.52)	1.73 (0.50)	0.55	0.15
Treatment	5.12 (0.83)	5.12 (0.92)	0.01	0.01
Adherence	65.96 (9.01)	67.11 (8.06)	15.22**	54.86

** $p < 0.01$

The results showed that the mean adherence to healthy lifestyle before the application of the cardiac educational program was 27.3 (6.82). The results showed that the mean adherence scores differed significantly one week after the application of the program and after one month (M= 65.96; 67.11) respectively, $F = 15.22$, $P < 0.01$. Findings of the effect of cardiac educational program on the level of knowledge, knowledge subscales and adherence to healthy lifestyle are presented in Table 1.

The knowledge among patients with CAD was measured using four subscales; pathophysiology, risk factors, symptoms and treatment subscale. The results revealed that the mean of the pathophysiology, risk factors, symptoms and treatment items improved at one week and one month after the application of the cardiac educational program. The highest improvement was in the mean of the pathophysiology and risk factors subscales. The lowest improvement was in the mean of the symptoms and the treatment subscales. This indicated that the educational needs for patients with CAD

were mainly regarding the pathophysiology and risk factors of CAD.

Concerning the effect of the cardiac educational program on the pathophysiology subscale, the total mean showed that there was gradual progress in the patients' knowledge of pathophysiology. The results revealed that the mean of all the items at one month after the application of the program was larger than that at one week after the program application. The item score ranged from 0-1.

The results showed that the highest improvement in knowledge level at one week and at one month after the program application was in the item "A heart attack is caused by the blocking of the blood flow to a part of the heart" with a mean difference 0.81. The lowest improvement in knowledge level at one month after the program application was in the item "What is coronary heart disease?" with a mean difference 0.37. Findings of the effect of the cardiac educational program on the pathophysiology subscale are presented in Table 2.

Table 2. The effect of the cardiac educational program on the pathophysiology subscale.

Items	Recruitment M (SD)	One week M (SD)	One month M (SD)
What is coronary heart disease?	0.35 (0.48)	0.39 (0.49)	0.72 (0.44)
What do you think is the leading cause of death in men?	0.44 (0.50)	0.72 (0.45)	0.82 (0.39)
What do you think is the leading cause of death in women?	0.45 (0.50)	0.77 (0.42)	0.78 (0.41)
A heart attack is caused by the blocking of the blood flow to a part of the heart	0.13 (0.34)	0.94 (0.24)	0.94 (0.28)
A heart attack results in damage of the heart muscle	0.15 (0.36)	0.88 (0.32)	0.90 (0.29)
Hardening of the arteries begins with the accumulation of fat deposits within the arterial wall	0.14 (0.35)	0.90 (0.29)	0.93 (0.26)
Total	1.67 (1.27)	4.61 (1.00)	5.00 (1.13)

Table 3. The effect of cardiac educational program on the risk factors subscale.

Items	Recruitment M (SD)	One week M (SD)	One month M (SD)
People who are physically active on a regular basis can cut their risk of heart disease in half	0.39 (0.49)	0.58 (0.49)	0.56 (0.50)
Heart disease is as dangerous for women as it is for men	0.32 (0.47)	0.75 (0.43)	0.64 (0.48)
It does not help to quit smoking after many years because one's health is already damaged	0.08 (0.28)	0.79 (0.40)	0.70 (0.46)
If one stops smoking but gains weight as a result, one's health is not benefited	0.08 (0.28)	0.82 (0.38)	0.71 (0.45)
Heredity is a risk factor of heart disease that you cannot change	0.16 (0.37)	0.96 (0.18)	0.96 (0.18)
Small changes in what you eat can lower blood cholesterol	0.26 (0.44)	0.86 (0.35)	0.97 (0.15)
High density lipoprotein (HDL) can lower one's risk of coronary heart disease	0.25 (0.43)	0.85 (0.35)	0.95 (0.21)
A person can reduce their chances of dying from heart disease through lifestyle changes	0.31 (0.46)	0.92 (0.28)	0.98 (0.15)
To get cardiac benefit from exercise, you need to get sweaty and out of breath	0.44 (0.50)	0.77 (0.42)	0.82 (0.38)
Total	2.30 (1.80)	7.30 (1.20)	(1.37)

With respect to the effect of the cardiac educational program on the risk factors subscale, the total mean indicated that there was gradual improvement in the patients' knowledge of the risk factors. The results revealed that the mean of all the items at one month after the application of the program was larger than that at one week after the program application.

The results showed that the highest improvement in knowledge level at one week and at one month after the program application was in the item "Heredity is a risk factor of heart disease that you cannot change" with a mean

difference 0.80. The lowest improvement in knowledge level at one month after the program application was in item "People who are physically active on a regular basis can cut their risk of heart disease in half" with a mean difference 0.17. The item "A person can reduce their chances of dying from heart disease through lifestyle changes" has the highest mean at one month (0.98) which reflects excellent understanding of the item.

The mean for the items "People who are physically active on a regular basis can cut their risk of heart disease in half", "Heart disease is as dangerous for women as it is for men",

“It does not help to quit smoking after many years because one’s health is already damaged” and “If one stops smoking but gains weight as a result, one’s health is not benefited” at one month after the application of the cardiac educational program was lower than the taht at one week after the application of the program. The mean for the remaining items at one month after the application of the cardiac educational program was higher than that at one week after the program application. Findings of the effect of cardiac educational program on the risk factors subscale are presented in Table 3.

4. Discussion

The results showed that the knowledge level among patients with CAD in the north of Jordan before the application of the cardiac educational program (N=84) was relatively low (the mean score was 8.70 out of 23). This finding is consistent with the results of many studies conducted in this regard (Eshah, et al., 2010; Mosca, et al., 2010) which showed that the level of knowledge regarding CAD was low. However, these studies used different tools to measure knowledge regarding CAD. The relatively low level of knowledge among the entire sample in the present study could be due to several reasons. One reason that may affect the knowledge could be the educational level of the participants. Around 45% of the participants had only secondary education or less. In the current study, the mean knowledge score was 5.7 and 6.3 out of 23 among those participants with educational level less than second secondary class and second secondary class group respectively, demonstrated a relatively low level of knowledge regarding CAD. On the other hand, the results indicated that mean knowledge score of the participants was 10.59 and 11.16 out of 23 among the participants with Diploma and baccalaureate degree respectively. The level of education could be a vital factor in affecting the level of knowledge. The finding of the current study is consistent with the studies of Andersson and Lepert (2001) and Assiri (2003) who reported that the level of knowledge was low among patients with CAD and it was positively correlated with the educational level.

The present study found that the cardiac educational program has a significant effect on knowledge and adherence to healthy lifestyle among patients with CAD. Knowledge and adherence to healthy lifestyle were relatively low before the application of the educational program. Knowledge and adherence to healthy lifestyle significantly improved after either one week or one month after the program application. This finding confirms earlier studies (Eshah, et al., 2010; Mosca, et al., 2010) which revealed that the cardiac educational program has a significant impact on improving both knowledge and adherence to healthy lifestyle among patients with CAD. However, Mosca and colleagues and Plach and colleagues applied cardiac educational programs differed from what had been used in the current study and the results indicated a significant improvement in knowledge and adherence using single educational session. Mosca and

Colleagues conducted a randomized clinical trial among a large sample of women. Plach and colleagues conducted a quaziexperimental study among patients with CAD undergoing cardiac catheterization. On the other hand, Eshah and colleagues applied the same cardiac educational program used as in the current study and the results showed a significant improvement in knowledge and adherence among a sample of healthy working adults.

The results of the current study showed that the improvement in the mean of knowledge one month after the cardiac educational program application was better than that at one week after the program application. This finding is consistent with other studies (Irmak & Fesci, 2010; McKinley, et al., 2009) which showed a sustained and more improvement in knowledge and adherence to healthy lifestyle over a long period of time. However, McKinley and colleagues conducted a randomized clinical trial and applied a different educational program to improve knowledge regarding CAD using individualized teaching sessions. In addition, Irmak and Fesci applied a different cardiac educational program among a sample of patients with CAD and the results showed that knowledge and adherence improved over time. The result of the current study could be due to the point that the participants may have received extra information from their cardiologist, cardiac nurses and media in the period between the first and second posttest. In addition, the researcher provided the participants with written information that may have helped them remember the information in the second posttest. Besides, the duration of three weeks between the first and the second posttest was not long to affect the memorization of the information in the second posttest.

Regarding the effect of the cardiac educational program on the knowledge subscales, the results showed that the mean pathophysiology and risk factors differed significantly one week and one month after the application of the cardiac educational program. The results indicated that the mean symptoms and treatment did not differ significantly one week and one month after the program application. These results could be due to the point that understanding the pathophysiology and the risk factors of CAD is seen as very serious for patient’s health from the patient’s point of view. In addition, patient’s perception of the importance of the pathophysiology and risk factors may affect the result. These factors may motivate the patients to learn more about the pathophysiology and the risk factors than the symptom and the treatment of CAD. This is supported by the studies conducted in this regard (Shahnaz & Ahmad, 2015) which showed that the issues of pathophysiology and risk factors were the most important areas for learning among patients with AMI before and after discharge from hospital. The symptoms and treatment of CAD were not considered as important for the patients. One possible reason to have a significant difference in the mean of pathophysiology and the risk factors after the application of the program is the patient’s desire to master the disease demands placed upon them, to know how to avoid future complications and to

know how to adhere to healthy lifestyle.

The improvement in the level of adherence to healthy lifestyle in the current study could be due to the fact that a significant portion of the sample is highly educated. This is congruent with the findings of other studies (Gerber, et al., 2008; Kang, Yang & Kim, 2010) that showed a positive correlation between high level of education and adherence to healthy lifestyle. Another important aspect that supports the concurrent improvement of knowledge which leads to the improvement of adherence to healthy lifestyle is the adoption of Orem's model as a framework that guided the conduction of the study. Orem (2001) assumed that providing individual with knowledge through education, the self-care activities and adherence to healthy lifestyle will be achieved.

The results showed that the highest improvement in knowledge level in the pathophysiology subscale at one week and at one month after the program application was in the item "A heart attack is caused by the blocking of the blood flow to a part of the heart". This result could be due to the simplicity of this item. This item was assessed using true or false question format, which might be easy to choose between two alternatives. The participants may have also perceived this item as important. This finding is consistent with the result of the study of Kayaniyil and colleagues (2009) who used the same knowledge scale presented in this study to assess the level of knowledge among patients with CAD. The result of the previous study showed that the item "A heart attack is caused by the blocking of the blood flow to a part of the heart" was coorrectly identified by 97% of the participants. The result of the current study showed that the lowest improvement in knowledge level at one month after the program application was in the item "What is coronary heart disease?" Seventy two percent of the participants correctly identified CAD as reduced blood flow to the heart at one month after the program application. This result could be due to the complexity of the item and the type of the research question used. This item was assessed using multiple choice format, which may propably affect the result. In addition, the participants may have perceived this item as not important to affect their health. This finding is consistent with the result of the study (Kayaniyil, et al) and revealed that almost 54% of the participants correctly identified CAD.

Regarding the effect of the cardiac educational program on the risk factors subscale, the results showed that the highest improvement in knowledge level at one week and at one month after the program application was in the item "Heredity is a risk factor of heart disease that you cannot change". This finding could be due to the simplicity of this item which was assessed using true or false question format. The lowest improvement in knowledge level at one month after the program application was in the item "People who are physically active on a regular basis can cut their risk of heart disease in half". This result could be due to the complexity of the item and thus, the participants did not understand the item well.

Regarding the effect of the cardiac educational program on the symptoms subscale, the results showed that the highest

improvement in knowledge level at one month after the program application was in the item "Indigestion may be a symptom of a heart attack". This result could be due to the simplicity of the item. The participants may have the ability to recognize the symptom well, because they may have experienced it. This finding is consistent with the studies (Noureddine, et al. 2010; Ahmad & Alasad, 2004) which showed that most participants can correctly recognize the symptoms of AMI. However, in the previous study, a cross-sectional design and a different tool was used to measure participant's knowledge regarding AMI symptoms.

4.1. Implications and Recommendations

The application of this study in practice may help improve the knowledge about CAD and the adherence to healthy lifestyle of patients with CAD. Specially qualified nurses are a cost effective in clinical practice to assist patients with CAD enhances their knowledge and adherence to healthy lifestyle. Providing appropriate cardiac health education for patients with CAD will be effective for both patients and families. Educational approaches for health should be included in a comprehensive program for patients with CAD to improve knowledge and adherence to healthy lifestyle from an early age and in order to reduce the prevalence of CAD. Conducting research exploring the effect of cardiac educational program on knowledge and adherence to healthy lifestyle among patients with CAD in Jordan may provide a basis for conducting other studies which can address the gap and the limitations of the present study.

4.2. Conclusion

The findings of this study suggest that it may be valuable to replicate this study using larger and more heterogeneous randomly selected sample in multiple settings, and well-defined instrument that fit and sensitive to Jordanian culture (Ahmad & Dardas, 2015). The effect of the cardiac educational program on knowledge and adherence to healthy lifestyle were still of reasonable magnitude one month after the program application. Further research is necessary to measure long-term adherence to healthy lifestyle among patients with CAD after the application of the cardiac educational program. Further research should be undertaken using a randomized clinical trial design that provides definitive results about the effectiveness of the implemented cardiac educational program.

The results of the current study suggest that the cardiac educational program should be implemented and focus more on female, older and patients with low educational and income level. The educational programs should focus on improving knowledge and adherence to healthy lifestyle among patients with CAD.

Acknowledgment

This study was partially funded by the University of Jordan.

References

- [1] Aldana, S. Greenlaw, R. Diehl, H. Salberg, A. Merrill, R. Ohmine S. and Thomas, C. (2005). Effects of an intensive diet and physical activity modification program on the health risks of adults. *Journal of American Diet Association*, 105, 371-381.
- [2] American Heart Association (AHA) (2010). Risk factors and coronary heart disease and stroke. Available online: <http://www.amhrt.org/presenter.jhtml?identifier=539>.
- [3] Ahmad, M.M. (2000). A correlational study of cognitive appraisal, coping strategies, and health status in prostate cancer patients. Case Western Reserve University. (proquest 3003358)
- [4] Ahmad, M. M., & Al Nazly, E. K. (2014). Hemodialysis: Stressors and coping strategies. *Psychology, Health & Medicine*, (ahead-of-print), 1-11. DOI: 10.1080/13548506.2014.952239
- [5] Tawalbeh L., Ahmad M. (2014). The Effect of Cardiac Education on Knowledge and Adherence to Healthy Lifestyle. *Clinical Nursing Research*. 23(3), 245-258. DOI: 10.1177/1054773813486476
- [6] Shahnaz A, Ahmad M. (Accepted, 2015). Educational Video Intervention effects on Periprocedural Anxiety Levels among Cardiac Catheterization Patients: A Randomized Clinical Trial. *Research and Theory for Nursing Practice*
- [7] Andersson, P. and Leppert, J. (2001). Men of low socioeconomic and educational level possess pronounced deficient knowledge about the risk factors related to coronary heart disease. *Journal of Cardiovascular Risk*, 8(6), 371-377.
- [8] Assiri, A. (2003). Knowledge about coronary artery disease among patients admitted to Aseer Central Hospital with acute coronary syndrome. *West African Journal of Medicine*, 22(4), 317-324.
- [9] Balady, G. et al. (2007). Core components of cardiac rehabilitation/secondary prevention Program. *Journal of Cardiopulmonary Rehabilitation and Prevention*; 27:121-129.
- [10] Bellman, C. Hambraeus, K. Lindback, J. and Lindahl, B. (2009). Achievement of secondary
- [11] preventive goals after acute myocardial infarction: a comparison between participants and nonparticipants in a routine patient education program in Sweden. *Journal of Cardiovascular Nursing*, 24(5), 362-368.
- [12] Buckley, T. McKinley, S. Gallagher, R. Dracup, K. Moser, K. and Aitken, L. (2007). The effect of education and counseling on knowledge, attitudes and beliefs about responses to acute myocardial infarction symptoms. *European Journal of Cardiovascular Nursing*, 6(2), 105-111.
- [13] Eshah, N. Bond, E. and Froelicher, E. (2010). The effects of cardiovascular disease prevention program on knowledge and adoption of a heart healthy lifestyle in Jordanian working adults. *European Journal of Cardiovascular Nursing*, 9(4):244-53.
- [14] Gerber, Y. et al. (2008). Interaction between income and education in predicting long-term survival after acute myocardial infarction. *European Journal of Cardiovascular Prevention and Rehabilitation*, 15, 526-532.
- [15] Irmak, Z., and Fesci, H. (2010). Effects of nurse-managed secondary prevention program on lifestyle and risk factors of patients who had experienced myocardial infarction. *Applied Nursing Research*, 23(3), 147-152.
- [16] Jordanian Ministry of Health (MOH). (2007). Mortality Data. Jordanian Ministry of Health Publications; 2007.
- [17] Kang, Y. Yang, I. and Kim, N. (2010). Correlates of health behaviors in patients with coronary artery disease. *Asian Nursing Research*, 4(1), 45-55.
- [18] Kayaniyil, S. et al. (2009). Degree and correlates of cardiac knowledge and awareness among cardiac inpatients. *Patient Education and Counseling*, 75(1), 99-107.
- [19] Krouse, H. (2000). Video modeling to educate patients. *Journal of Advanced Nursing*, 33(6), 748-757.
- [20] Lauck, S. Johnson, J. and Ratner, P. (2009). Self-care behavior and factors associated with
- [21] patient outcomes following same-day discharge percutaneous coronary intervention. *European Journal of Cardiovascular Nursing*, 8(3), 190-199.
- [22] Ahmad M, Alasad J. Nawafleh H. (2010). Nursing care and quality of life among Jordanian patients with cancer. *Leadership in Health Services*, 23 (3), 233-243. DOI: 10.1108/17511871011061055
- [23] Ahmad, M. & Alasad, J. (2007). Patients' preferences for nurses gender in Jordan. *International Journal of Nursing Practice*, 13, 237-242.
- [24] Ahmad, M. (2015) Knowledge and beliefs about Cancer Prevention and Care in Jordan. *International Journal of Medicine*, 1(1), 1-5.
- [25] Marriner-Tomey, A. and Allgood, M. R. (2006). *Nursing Theorists and their Work* (6th Ed.) Louis: Mosby.
- [26] Mosca, L., et al. (2010). A randomized clinical trial of secondary prevention among women hospitalized with coronary heart disease. *Journal of Women's Health*, 19(2), 195-202
- [27] Orem, D. (2001). *Nursing: Concepts of Practice*. St Louis, MO: Mosby.
- [28] Polit, D. and Beck, C. (2014). *Essentials of Nursing Research: Appraising Evidence for Nursing Practice*. (8th ed). Lippincott Williams and Wilkins. New York.
- [29] Alasad J., Abu Tabr N., Ahmad, M. (2015). Patients' Experience of being in Intensive Care Units. *Journal of Critical Care*. DOI:10.1016/j.jcrc.2015.03.021
- [30] Ahmad, M. & Alasad, J. (2004). Predictors of patients' experiences of nursing care in medical-surgical wards. *International Journal of Nursing Practice*, 10, 5, 235-241
- [31] Ahmad, M., & Dardas, L. (2015). Jordan: Aspiration for a Culturally Sensitive Nursing Model. in J. J. Fitzpatrick & A. L. Whall (Eds.). *Conceptual models of nursing: Global perspectives*. Upper Saddle, NJ: Pearson. ISBN-10: 0133805751 • ISBN-13: 9780133805758
- [32] Skinner, J. Cooper, A. and Feder, G. (2007). Secondary prevention for patients following a myocardial infarction: summary of NICE guidance. *Heart*, 93(7), 862-864.

- [33] Taylor, S. (2006). Dortha E Orem's self care deficit theory of nursing. In A. Marriner-Tomer & M. Alligood (6th Eds.), *Nursing Theorists and Their Work* (pp. 275-281). Louis: Mosby.
- [34] Waltz, C. Strickland, O. and Lenz, E. (2005). *Measurement in nursing and health research*. 3rd edition. New York, Springer.
- [35] Ahmad, M. (2014). Jordanians knowledge and beliefs about cancer, *Global Journal on Advances in Pure & Applied Sciences* [Online]. 04, pp 38-41. Available from: <http://www.world-education-center.org/index.php/paas>
- [36] Ahmad M. (2010). Validation of the Cognitive Appraisal Health Scale with Jordanian patients. *Nursing & Health Sciences*, 12 (1), 74-79.
- [37] Al-Ghabeesh S., Ahmad M. (2012). Unidimensional and multidimensional breathlessness specific instruments for adult population: Literature review. *Journal of Natural Sciences Research*, 2 (8), 1-15.
- [38] Tawalbeh L., Ahmad M. (2013). Personal Resource Questionnaire: A Systematic Review. *The Journal of Nursing Research*, 21 (3), 170-177.
- [39] Ahmad, M. Daken, L., Ahmad, H. (2015). Quality of Life for Patients in Medical-Surgical Wards. *Clinical Nursing Research*, 24 (4), 375-387. DOI: 10.1177/1054773813519470
- [40] Smith, M. Hicks, V. and Heyward, V. (1991). Coronary heart disease knowledge test: developing a valid and reliable tool. *Nurse Practitioner*, 16(28), 35-38.
- [41] Ahmad M., Al-Rimawi R., Masadeh A., Atoum M. (2015). Workplace Violence by Patients and Their Families Against Nurses: Literature Review. *International Journal of Nursing and Health Science*; 2 (4): 46-55