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Efficacy of Cardiac Education on Dietary Habits of Subjects Participating in Cardiac
Rehabilitation

A thesis
presented to
the faculty of the Department of Family and Consumer Sciences
East Tennessee State University

In partial fulfillment
of the requirements for the degree
Master of Science in Clinical Nutrition

by
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May 2005

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Keywords: Cardiac Rehabilitation, Cardiac Education, Dietary Habits

ABSTRACT

Efficacy of Cardiac Education on Dietary Habits of Subjects Participating in Cardiac Rehabilitation

by

Marie-Rose A. Abdo

The purpose of this study was to determine if cardiac nutrition education can affect dietary patterns of subjects participating in Cardiac Rehabilitation. Surveys, a pretest given prior to the first cardiac class and a second identical test, administered following cardiac rehabilitation classes, were conducted. Fifty-five randomly selected participants from the outpatient Cardiac Rehabilitation Program were initially given the posttest. Thirty-three of the 55 surveys were returned. Cardiac health classes offered by various health professionals included cardiac nutrition education, group nutrition classes, guest lectures on nutrition, and cooking demonstrations. The tests were compared to measure changes in diet and were analyzed for both surveys. Paired t-tests were used for analysis along with frequency, percentage and group statistics. The majority of the respondents demonstrated a statistically significant healthy increase in dietary changes after having participated in the classes.

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CHAPTER 1 INTRODUCTION

Cardiovascular disease (CVD) is the most common cause of death in the United States. In 2002, it was estimated that nearly seventy million Americans had some form of CVD (1). At least 62 million Americans have CVD, and over two and a half million die each year from the disease (2). Older adults are at higher risk for chronic illnesses and are interested in learning more about their own health. With demographic changes and an increase in the number and proportion of older adults, there is now a greater demand for health promotion and patient education by rehabilitation professionals including cardiac rehabilitation (3).

Background

Originating in the 1950s, cardiac rehabilitation programs focus on exercise training, with approximately 2,000 cardiac rehabilitation programs currently available around the nation. Today's programs include risk factor modification training, education of patients and families on the disease process, management of diet, exercise, medications, and stress, and the provision of psychological support during the recovery phase of the illness (4). Cardiac rehabilitation had been proven to improve quality of life by reducing disability, morbidity, and mortality. Thus, these programs have evolved from an exercise focus to include a more comprehensive and preventive approach addressing multiple risk factors for CVD with improved education focusing on tobacco use, cholesterol levels, high blood pressure, obesity, and physical activity (5).

More guidelines have emerged emphasizing the role of cardiac rehabilitation as a secondary prevention in subjects with CVD (5, 6). Current cardiac rehabilitation programs are designed in three phases to ensure safe recovery and enhance lifestyle and dietary modifications to improve health. Individuals of any age have demonstrated a great benefit from cardiac rehabilitation (5).

Phase I of cardiac rehabilitation is offered as a service to those who have experienced a heart attack, who have had cardiac surgery, balloon angioplasty, coronary stents, or have known heart disease. With a physician's referral, nurse educators and exercise specialists provide monitored activity and individual instruction to reduce risk factors for heart disease. Guidelines for a personalized exercise program are reviewed with the patient and family. By physician referral, Phase II rehabilitation will provide monitored (EKG) exercise therapy supervised by a registered nurse and an exercise specialist, both trained in Phase II plan of care. Patients will be given an individualized exercise prescription, and over a three-month period, improve their ability to exercise and progress to a heart healthy lifestyle. Phase III cardiac rehabilitation is also available for continued exercise therapy. Other education opportunities are available to assist the patient with smoking cessation, weight reduction, cholesterol education, blood pressure control, and stress management.

Cardiac rehabilitation programs in the United States are available in most hospitals with a proven benefit to participants. This benefit is seen through improvements in lifestyle and dietary behaviors. The goals are to assist the patient in developing positive physical and lifestyle changes, including the reduction or modification of risk factors through exercise training, smoking cessation, and dietary programs (7).

Statement of the problem

The purpose of this research was to survey subjects in a cardiac rehabilitation program to determine the effects of cardiac education on those participating in the program and to be able to identify healthy changes in their lifestyle and their diets.

Significance of the problem

According to the World Health Organization estimates CVD killed 14.7 millions individuals in 1990 and 17 million in 1999 (1). All of the issues that contributed to the increase in CVD in the United States, specifically aging of the population, explosion of

obesity and diabetes, and physical inactivity, have profound implication and require a multidisciplinary approach for therapy. It has been shown that one billion people across the world are now overweight and obese. This in part is due to a decrease in fruit, vegetable, and whole grain intake coupled with an increase in saturated fat, sugar, and refined carbohydrates. These nutritional problems affect people of all ages and have even been seen in children under the age of five (1). Another cause for obesity and increase risk of CVD is physical inactivity. WHO estimates that 60% of the world population is insufficiently physically active (1).

With all the advances seen in the last decade in the treatment of patients with CVD, cardiac death is still the leading cause of mortality in the United States in both males and females. The role of cardiac rehabilitation programs as a secondary prevention for CVD has been demonstrated and has been shown to favorably impact morbidity and mortality (8).

Despite the apparent benefit of cardiac rehabilitation, it has been shown that only 11% to 38% of males and females actually participate in rehabilitation programs, which represents about one-third of those eligible (9,10).

Studies have shown that elderly patients are less likely to be referred to cardiac rehabilitation and exercise training programs. Whether or not the referred patients initiate and complete the program depends greatly on the strength of the physician's recommendation, which usually is very weak. This is seen through the fact that physicians know as it has been documented that elderly patients initiate the program half as frequently as do younger patients (11). However, despite the limited number of patients participating in cardiac rehabilitation, studies have demonstrated great improvements in physical functioning leading to an improvement in CVD and health in the subjects enrolled in cardiac rehabilitation program (9).

Diet modification along with exercise is a leading cause for weight loss and subsequently for better control of dyslipidemia. The primary results are seen as a decrease in low-density-lipoprotein (LDL), a decrease in triglyceride (TG), and an increase in high-density lipoprotein (HDL) (9). The effect of cardiac rehabilitation programs on dietary habits of subjects involved and its effect on morbidity and mortality

has not been the main subject of a major study (10). This research study is intended to study the effects of cardiac education on changes in dietary habits in a more profound way.

Question to be Addressed

To what extent can cardiac rehabilitation program including nutrition education help people make changes in their lifestyle and dietary habits?

Hypothesis

The subjects participating in the cardiac rehabilitation program receive cardiac nutrition education that positively influences their self-reported lifestyle and dietary habits.

Null Hypothesis

The subjects participating in the cardiac rehabilitation program receive cardiac nutrition education that does not lead to positive changes in self-reported lifestyle and dietary habits.

Assumptions

Assumptions of this study include:

1. It is assumed that subjects will self-report
2. It is assumed that subjects will feel comfortable in answering the questions
3. It is assumed that subjects will answer the survey honestly

Limitations

Limitations of this study include:

1. This study was limited to subjects in Johnson City Medical Center hospital and results cannot be generalized
2. Not all subjects were able to attend all cardiac rehabilitation classes, due to weather problem, lack of transportation, illness, fatigue or lack of interest

3. Nutrition education was provided by various cardiac rehabilitation professionals
4. Relatively small number of subjects completed the cardiac rehabilitation program
5. Level of education might vary from one person to another, affecting their knowledge and ability to understand the information given to them

Definition of Terms

Cardiac Rehabilitation Program- Cardiac rehabilitation is defined as the process of development and maintenance of a desirable level of physical, social, and psychological functioning after the onset of a cardiovascular illness (12).

High-density lipoprotein (HDL)- A plasma protein synthesized in the liver and involved in transporting cholesterol and other lipids to the liver to be disposed. Higher levels of high-density lipoprotein are associated with decreased cardiac risk profiles (13).

Low-density lipoprotein (LDL)- A plasma protein synthesized from very low-density lipoproteins or by the liver; delivers lipids and cholesterol to the body tissues (13).

Triglycerides (TG)- A simple fat compound consisting of three molecules of fatty acid and glycerol. The total amount of triglyceride and the amount, proportion, and kinds of lipoproteins are important in the diagnosis and treatment of many diseases and conditions, including diabetes, hypertension, and heart disease (13).

Lipoprotein- A conjugated protein synthesized in the liver in which lipids form an integral part of the molecule. They contain varying amounts of triglycerides, cholesterol, phospholipids, fat-soluble vitamins, and proteins and are classified according to their composition and density. Practically all of the plasma lipids are present as lipoprotein complexes (13).

Trans-fatty acids- Fatty acids found in margarines and shortenings as artifacts after hydrogenation (13).

Saturated fatty acids- Fats in which all of the carbon atoms in the hydrocarbon chain are joined by single bonds. They exist mostly as components of fats (triglycerides) or other lipids of animal origin. A diet high in saturated fatty acids may contribute to a high serum cholesterol level and appears to be associated with an increased incidence of coronary heart disease in some population (13).

Obesity- An abnormal increase in the proportion of fat cells, mainly in the viscera and subcutaneous tissues of the body (13).

Diabetes Mellitus- A complex disorder of carbohydrate, fat, and protein metabolism that is primarily a result of a deficiency or complete lack of insulin secretion by the beta cells of the pancreas or resistance to insulin (13).

Hypertension- A disorder characterized by elevated blood pressure persistently exceeding 140/90 mmHg (13).

Cardiovascular Disease (CVD)- Any abnormal condition characterized by dysfunction of the heart and blood vessels (13).

Self-efficacy- It reflects the individual's perceptions or beliefs about how capable he or she is in performing a specified activity (14).

Self-motivation- It is the "want-to" component of individuals' actions, making this concept useful in developing an understanding of the voluntary nature of an activity such as choosing to attend and adhere to cardiac rehabilitation (14).

Self-esteem- It indicates the extent to which an individual believes he or she is significant, worthy, capable, and successful (14).

Depression- A mood disturbance characterized by feelings of sadness, despair, and discouragement resulting from and normally proportionate to some personal loss or tragedy (13).

Anxiety- Anticipation of impending danger and dread accompanied by restlessness, tension, tachycardia, and breathing difficulty not associated with an apparent stimulus (13).

Social support- The perceived ability and actual provision of reliable assistance from other persons (13).

CHAPTER 2

LITERATURE REVIEW

Trends and Outcomes in Cardiovascular Diseases

Despite all the advances made in pharmacological treatment and the strong evidence that modifying the diet of individuals can help as a secondary prevention for cardiac death, CVD remains the leading cause of death in the United States (9). Diet in its composition and volume is a modifiable risk factor for CVD as it influences multiple known risks including hypertension, diabetes mellitus, obesity, and high blood cholesterol (15).

Many researchers have shown that cardiac patients would have been interested in following a heart healthy diet after being discharged from the hospital if they were educated on the kinds of foods that are lower in fat and cholesterol (15). Studies have shown that cardiac rehabilitation programs are an important part to make people aware of a heart healthy diet (16). These multidisciplinary programs consisting of exercise training, education about diet and lifestyle modifications, and cardiac risk factor reduction have been shown to increase the functional capacity, improve quality of life, and decrease cardiac-related morbidity and mortality (16).

Many studies have shown a 20% increase in functional capacity after such programs, leading to a reduction in LDL, total cholesterol, triglycerides, hypertension, and obesity with an increase in HDL, all leading to positive outcomes of CVD (15, 16, 17). Because of the aging population and the shift of cardiovascular disease from an acutely fatal event to a chronic disease, there is a marked and growing need for medical services that help patients improve their quality of life, lessen symptoms, increase functional capacity, and decrease disability while reducing the risk of subsequent morbidity and mortality. To the extent that these needs are met, the burden of heart disease will be lessened and medical care costs for cardiovascular diseases will be reduced. Rehabilitation must be integrated with the whole treatment provided for the patient and should not be regarded as an isolated form of therapy (18).

Cardiac Rehabilitation Programs for Patients with Heart Disease

The benefits of cardiac rehabilitation are well established today. There is a growing consensus among health professionals that cardiac rehabilitation should be considered a standard of care due not only to its defined medical benefit but to its cost-effectiveness from reduced disability, improved productivity, and reduced health care costs (19).

The Agency for Health Care Policy and Research from the United States Department of Health and Human Services, which published "Clinical Practice Guidelines for Cardiac Rehabilitation", summarized the scientific basis for recommendations of cardiac rehabilitation services and the outcomes that result from exercise training, education, counseling, and behavioral interventions (20). A reduction in mortality, improvement in the number of cardiac events, improvement in symptoms, increased exercise tolerance, improvement in blood lipids, increased smoking cessation, and improved psychosocial outcomes were the results of the cardiac rehabilitation program (20).

In the article by McSherry et al., a previous researcher demonstrated significant improvements in work capacity. It has been shown that parameters of exercise capacity and fitness predict the risk of major cardiac events and mortality (21). In addition, cardiac rehabilitation has been shown to help improve all lipid levels, with significant improvements in HDL and TG levels and with smaller but significant reductions in LDL (21).

The American Heart Association recognizes the impact of obesity in CVD with a prevalence of 40% in patients with CVD. Studies of cardiac rehabilitation and exercise training generally report a significant improvement in obesity, with a decrease in body mass index, in patients following the program (11, 18). A follow-up to the guidelines established by the cardiac rehabilitation program also concluded that cardiac rehabilitation and secondary prevention is cost-effective because of fewer readmissions to the hospital and improvements seen in the subjects (21).

Cardiac Nutrition Education for Patients with Heart Disease

Due to the trend in obesity and increase in serum cholesterol levels, nutrition education within cardiac rehabilitation programs focuses on helping patients make healthful dietary changes to control weight and manage serum lipids (10, 22, 23). Data evaluating the efficacy of nutrition education within cardiac rehabilitation programs are limited, but at least one study has shown that as part of a comprehensive cardiac rehabilitation program nutrition education under the direction of a registered dietitian can lead to long-lasting favorable changes in diet, body weight, and serum cholesterol (10). Additional research indicates that cardiac patients view diet as important in the prevention and treatment of CVD (15, 22). Nutrition education aims at providing adequate information to the target group on the types of foods to avoid in order to decrease the risk of CVD, with expectations to improve nutrition behaviors (15).

According to an article by Song and Lee, premature mortality from heart disease can be substantially reduced when people integrate various health behaviors into their lifestyle, such as stopping smoking, reducing alcohol consumption, eating more healthy diets, and getting sufficient exercise (24). Adherence to nutrition education is limited in the research, but motivation and readiness to change eating behaviors may lead to healthful eating behaviors in response to the cardiac rehabilitation program (15). Educational needs for cardiac rehabilitation patients include knowing which food to buy, interpreting food labels, knowing the quantity of foods and types of foods flavoring allowed such as salt and spices, and identifying foods high in fat and sodium (10).

Most patients consider diet as important in the treatment and prevention of heart disease but only one-third report completely understanding the information. Repeated exposure to nutrition messages is important in helping people make appropriate food choices.

Nutrition education programs should take into consideration every individual's level of understanding in order to make the information more clear and increase positive responses to the information given (25).

According to research by Koikkalainen et al., most patients with CVD report difficulties in following nutritional advice when eating in social situations (26). The often-mentioned difficulties are: “there is too much food available” and “healthy diet is easily forgotten while eating outside home”.

Behavior Changes

Multiple barriers have been noted for participation in cardiac rehabilitation programs. First, the referral of patients to a cardiac rehabilitation program is dependent upon the healthcare provider (11). It is reported that 80% to 85% of physicians recommend that their patients follow an exercise program after a cardiac event (14). Many physicians did not follow correct guidelines for referral due to a lack of awareness that guidelines for referral exist. Limited access and funding for available programs are other reasons for non-referral. Nevertheless, the strength of the primary physician’s recommendations for participation in cardiac rehabilitation has been shown to be an important predictor of patient’s participation in those programs (14).

Psychosocial factors including self-efficacy, self-motivation, self-esteem, depression, anxiety, and social support have been shown to be important variables that affect patients’ motivation and adherence to cardiac rehabilitation programs. Gender can be a barrier as well, with only 20% of patients entering cardiac rehabilitation programs being female despite the fact that 40% of cardiac events occur in females. Although 83% of these women started the exercise program, 28% stopped after one month, and only 28% were still exercising three months later (14).

Barriers have been identified impede successful dietary change for cardiac rehabilitation patients, including difficulties with the taste, selection, and preparation of recommended foods, lack of understanding food labels, lack of spouse or family support, and challenges in making appropriate food choices at social gatherings or while traveling (10).

In a study by Timlin et al., it was noted that motivation to change arises from the concept that a person passes through stages of readiness to change a behavior. There are five stages of behavior change that include pre-contemplation, contemplation,

preparation, action, and maintenance. The subject will progress through those stages in order to change and will have to maintain the new behavior for success (10). According to the social cognitive theory and the health belief model, behaviors change through a series of predictable and well-defined stages. Motivation plays an important role in determining a person's ability and readiness to change, and success depends on a person's willingness to persevere through the stages of change (15). In addition, motivation to change behavior and maintain changes diminishes with time after a cardiac event; therefore, dietitians should design interventions to reinforce behavior change success. Although motivation has been recognized as an important variable in a cardiac patient's ability to adopt a healthy lifestyle and to prevent further events, previous research has rarely focused on a comprehensive education program with a direction towards motivation enhancement and lifestyle intervention (24).

Stages of Change

The first stage is the pre-contemplation stage where an individual sees no need to change and may be unaware of risks in his/her behaviors. The second one is the contemplation stage where a person is aware of a problem behavior but has little commitment to change. The third one constitutes the preparation stage where a person is making active effort to change a behavior. The fourth stage defines the action through which an individual has progressively modified a behavior for up to six months. The final stage is known as maintenance where a person has integrated the new behavior into everyday lifestyle for longer than six months and is working towards preventing relapse or regression to any previous stage of change or behaviors (15).

According to Frame et al., it is probable that the cardiac event, cardiac surgery, or physician order for cardiac rehabilitation cause many subjects to take action on reducing dietary fat intake in a rapid effort to restore health. However, subjects show little progress in adopting a healthy diet by increasing their intake of fruits and vegetables because it will not directly affect their health or decrease their lipid profile, although it is important to make this change (15). Studies have shown that persons in the early stages of change (pre-contemplation, contemplation) have higher intakes of fat

and lower intakes of fruits and vegetables, whereas in the later stages (action, maintenance), they have lower intakes of fat and higher intakes of fruits and vegetables (15).

Role of Diet in Heart Disease

There are three types of fat present in the diet: saturated, monounsaturated and polyunsaturated (27). Levels of cholesterol in the blood are influenced by dietary fat and other factors including physical activity, smoking, body weight, and genetics. About two-thirds of cholesterol is transported as LDL, and HDL amounts to 15% to 25% of total cholesterol.

Saturated fatty acids are widespread in all animal products. They are known to raise LDL, which is the harmful form of cholesterol; therefore, their consumption should be limited. Monounsaturated fats are present in olive, canola, and peanut oils and in most nuts. They are the most healthy and beneficial fats as they help reduce total blood cholesterol without reducing HDL, known as the beneficial cholesterol (27).

Polyunsaturated fatty acids (PUFA) are found in safflower, sunflower, corn, and cottonseed oils and fish. Two types of PUFA exist: the omega-3 and omega-6 PUFA. The omega-3 fatty acids, essential in small amounts, are mainly found in oily fish, do not affect blood cholesterol significantly, but reduce plasma triglycerides (27).

A study by Iso and Rexrode showed a significant inverse association between increasing intakes of fish and omega-3 fatty acids and decreased risk of stroke during 16 years of follow-up of the Nurse Health Survey (NHS) (28). The body is unable to make the omega-6 fatty acids, so small amounts are essential from the diet. They reduce both LDL and HDL cholesterol levels; however, large amounts might cause atherosclerosis. Fish oils have anti-inflammatory and anti-thrombotic properties.

The transfatty acids are altered fats which raise LDL cholesterol like the saturated fats. They are found in margarine, spreads, partially hydrogenated oils, and bakery products. Studies report that high consumption of these fats reduces HDL cholesterol levels, has harmful effects on the linings of the arteries, and may increase the risk for diabetes type 2 (27).

A systematic review of 27 studies reported that reducing dietary fat is associated with a 16% reduction in risk and a 9% decline in mortality rates from CVD (29). Although there is much controversy on how significant dietary fat is on health, virtually all experts strongly advise limiting intake of saturated fats and trans-fatty acids. One study of 80,000 nurses reported that women whose total fat consumption was 46% of total caloric intake had no greater risk in general for a heart attack than did those for whom fat represented 30% of calories consumed. Women whose diets were high in trans-fatty acids, however, had a 53% increased risk for heart attack compared to those who consumed the least of those fats (29).

Dietary cholesterol raises LDL cholesterol levels and causes atherosclerosis. Controlled metabolic studies in humans have found that dietary cholesterol raises levels of total and LDL cholesterol in blood but has lesser effects compared to saturated and trans fatty acids. In the landmark Framingham study, Dawber and colleagues found no significant association between egg consumption and incidence of CVD despite a wide range of egg consumption (29).

The United States Department of Agriculture publishes dietary guidelines that recommend a low fat, high carbohydrate diet to lower serum cholesterol (30) and prevent CHD; however this diet has been found to reduce HDL levels and raises fasting triglyceride (31, 32).

Whole grains and fiber are known to produce slower glycemetic and insulinemic response, decrease risk of diabetes associated with heart disease. They are rich in fiber, antioxidant vitamins, magnesium, and phytochemicals, which can have cardioprotective effects. Many prospective cohort studies have shown an inverse relationship between fiber intake and risk of CHD with a relative ratio of 0.81, meaning a 81% decrease risk of CHD with increased fiber intake of 10 g/day (29).

Scientific data regarding protein and the risk of CVD are limited, some studies have shown a small decrease in CVD after increasing intake of protein, regardless of fat intake, especially in women.

It is recommended that people consume more white meat as it has more protein than red meat which contains more saturated fats. (29).

Studies have shown an increased relationship between moderate alcohol consumption and risk of CHD. An article by Solomon and Hu has shown a 55% reduction in CVD incidence among diabetic women who consumed half a drink daily compared with nondrinkers (33). Two other studies showed the same results in diabetic and non-diabetic men (34, 35). CVD is a major cause of morbidity and mortality for people with diabetes mellitus. About 69% deaths from CVD was seen in people with diabetes. The reduced risk of CVD associated with alcohol is believed to be due to the effect of alcohol on the lipid profile, including increases in HDL cholesterol. It has been suggested that alcohol increases sensitivity to insulin and has favorable effects on glucose metabolism (34, 35). Yet, moderate alcohol consumption has been associated with decreased risk of type 2 diabetes mellitus in some but not all studies. Given this uncertainty, many patients with diabetes are advised to avoid alcohol (35). However, an increase in insulin, which is common among diabetics, has been implicated as an important risk factor for CVD, and light to moderate alcohol consumption has been reported to lower fasting insulin levels, which could decrease the risk of CVD (35).

A study by Valmadrid et al. showed that older-onset diabetic persons who drank higher amounts of alcohol has a considerably reduced risk of death to CVD compared with nondrinkers (34). A study by Ajani et al. showed that low-to-moderate consumption of alcohol is associated with a decreased risk of CVD mortality in men with diabetes, just as it is among men without diabetes, and that there are comparable risk reductions for CVD mortality in both groups (35).

CHAPTER 3

DESIGN AND METHODOLOGY

This study was performed for the purpose of determining the effects of cardiac nutrition education on dietary habits of subjects participating in a cardiac rehabilitation program. The intervention was performed with individuals of the outpatient cardiac rehabilitation clinic at Johnson City Medical Center. Various health professionals were responsible for assisting the individuals in their classes, and efficacy of the delivery of the cardiac nutrition education was performed by comparison of identical pre-and posttest result, on dietary habits of those subjects participating in cardiac rehabilitation.

Subjects

The out-patient cardiac rehabilitation program at Johnson City Medical Center (JCMC) is composed of 36 cardiac classes during three months. Study subjects were individuals enrolled in the cardiac rehabilitation program at the Johnson City Medical Center in Johnson City Tennessee. During the recruitment period for this investigation, individuals enrolled in the cardiac rehabilitation following a cardiac event and/or cardiac surgery. All individuals agreed to participate in the study, while only 33 remained in the study until the end. Subjects received a recipe booklet upon completion of the study.

Instrument

Demographic and descriptive characteristics of the subjects were collected using the rehabilitation program's standardized assessment instruments. Data were collected on eating habits and smoking/exercise habits prior to the rehabilitation period using the standardized instrument or pretest (Appendix A). Data on changes in eating habits and smoking/exercise habits were collected at the end of the rehabilitation period using a posttest survey (Appendix B).

The posttest was developed based on a pre-participation survey instrument that was administered to all subjects prior to beginning the cardiac rehabilitation classes. Prior to completing the posttest, the subjects who were scheduled to attend 36 classes for the completion of the cardiac rehabilitation program, attended at least 15-20 cardiac classes including 2-3 cardiac nutrition classes to be eligible for the study.

Data Collection Procedure

The principal investigator observed attendance in the cardiac classes and made note of participation in the classes for each subject involved in the study. The participants were asked to complete the survey based on any lifestyle changes that occurred after participating in the cardiac classes. The questionnaire on changes in eating habits consisted of 25 items. Assessments were made in written form by participants completing the survey on eating habits at the two assessment time points: baseline and 12-18 weeks. Analysis options include recommended food intake for subjects with heart disease based upon the heart-healthy diet and ability of subjects to follow a healthy diet or improve their diet after having participated in the cardiac classes.

Data Analysis

Data from the subjects participating in the cardiac rehabilitation program were pooled. The sample was evaluated for dietary changes. Descriptive statistics with the SPSS program were used to obtain preliminary information about the variables. The reported changes in eating habits were presented as a percent of subjects reporting the change.

CHAPTER 4 RESULTS

The Sample

Participants in the cardiac rehabilitation program were from different regions in Northeast Tennessee and were enrolled in the program for 12 to 18 weeks to complete 36 cardiac rehabilitation classes. Subjects having participated in 15 to 20 cardiac rehabilitation classes including at least two to three nutrition classes were enrolled in the study. No data were collected on ethnicity or socioeconomic status. Fifty-five subjects completed the pretest and 33 completed the posttest. Anyone who was not present for the pretest was asked not to take the posttest. All participants were allowed adequate time to complete the posttest.

Data Analysis

The survey included 23 objective questions for the pretest and 24 objective questions with one subjective question for the posttest. (Appendix A). All of the questions had measurable answers in terms of quantity of foods. The subjects were instructed that only one correct answer for each question existed and they were allowed to leave the question blank if they did not know the answer.

Analysis was done by SPSS using descriptive statistics and frequencies, and results were calculated based on the changes found in the posttest compared to the pretest, for each subject and for the combined group. The answers were recoded attributing the greatest score to the best possible answer for each question. The results of the scores are listed in Tables 1-4. Paired t-test analysis was used to determine statistical significance for total scores on categories of different variables in both tests. Aggregate statistics were used to compare scores between the two genders. Items were recoded so that the highest score was attributed to the best answer for each question in the survey. An increase in the mean statistic for each variable in the posttest

indicates a self-reported improvement in lifestyle and dietary behavior as compared to the pretest. All tests were performed at the α 0.05 level of significance. The results of the t-test analysis are listed in Tables 5 and 6. The statistical analysis for these items is included in Appendix B.

Variables

Variables	Pretest		Posttest		Percent change
	N	Mean Statistic	N	Mean Statistic	
Skip breakfast	33	0.76	33	0.76	0%
Vegetable Serving	33	2.12	32	2.19	3.19%
Beans Serving	32	0.94	32	1.09	13.70%
Fruit Serving	33	1.73	32	2	13.50%
Dairy products	31	2.26	31	2.48	9.10%
Butter	30	0	32	0	0.00%
Stick margarine	30	0	32	0	0.00%
Transfatty acid free	30	0.27	32	0.31	12.90%
Oil	30	0	32	0	0.00%
Vegetable oil	30	0.53	32	0.56	5.30%
Shortening	30	0	32	0	0.00%
Peanut butter	30	0	32	0	0
Olives	30	0	32	0	0.00%
Meat	31	1.81	32	1.78	-1.60%
Egg yolks	33	2.61	32	3	13.00%
Grains	33	2.48	31	2.35	-5.50%
Nuts	32	1.13	31	1.16	2.60%
Snacks	33	3.94	32	3.84	-2.60%
Salt	31	0.68	32	0.72	5.50%
Caffeine	32	3.62	33	3.76	3.70%
Water	32	1.97	30	1.87	-5.30%
Eat out	31	2.48	32	2.66	6.70%

Alcohol	31	2.68	32	2.84	5.60%
Physical activity	32	1.97	33	2.73	27.83%
Moderate week time	31	1.23	32	1.63	24.50%
Vigorous week time	32	0.28	31	0.74	62%
Restricted activity	30	0.33	31	0.19	-73%
Smoking	33	2.82	31	2.94	4%

	Frequency	Percent	Valid Percent
Valid 0	1	3	3.3
1	1	3	3.3
2	9	27.3	30
3	12	36.4	40
4	7	21.2	23.3
Total	30	90.9	100
Missing System	3	9.1	
Total	33	100	

- 0: No present interest in making lifestyle change
- 1: Thinking about making lifestyle change
- 2: Making plans to achieve this change
- 3: Recently started implementing this change
- 4: Have been doing this for six months or more

Table 3. Barriers: Frequency and Percentage to Item Validity				
		Frequency	Percent	Valid Percent
Valid	1	1	3	14.3
	2	2	6.1	28.6
	3	1	3	14.3
	4	1	3	14.3
	5	1	3	14.3
	6	1	3	14.3
Total		7	21.2	100
Missing System		26	78.8	
Total		33	100	

- 1: Meeting goals- means no barriers
- 2: Time, weather
- 3: Indifferent, lazy
- 4: None
- 5: Recent surgery
- 6: Staying focused

Skip Breakfast

The first question addressed breakfast. In this question, subjects were asked to answer whether or not they skipped breakfast. There was no difference in the pretest and posttest in skipping breakfast/not skipping breakfast as the results showed the same mean deviation of 0.76 in both test results.

Servings of Vegetables/day

The second question addressed the serving of vegetables that subjects eat daily. There was a significant change in the amount of vegetables eaten daily, and we noticed an increase by 3.19% in the amount of vegetables eaten by subjects who used to limit themselves to only one or two servings a day. This increase indicated an improvement in the intake of vegetables.

Servings of Beans/week

The third question was included in the survey to determine what kinds of vegetables the subjects consumed, as some are more beneficial than others in terms of nutrient contents. There was a 13.7% increase in consumption of beans in the posttest, which was a great improvement.

Servings of Fruits/day

The fourth question addressed the servings of fruits eaten throughout the day. Subjects were eating more fruits than they were previously and this is seen through a 13.5% increase in fruit serving. This showed a positive behavior towards a better outcome.

Dairy Products

This question addressed all kinds of dairy products that subjects normally use. It is important to know whether people are using non-fat dairy products or regular dairies as those food types are essential and important to be used everyday. There was a 9.1% increase in dairy product consumption as seen in the posttest, which indicated a great improvement.

Fats

The fats listed in question six include some good sources of fat, oils such as canola oil, olive oil, and soy oil, and trans fatty acid free margarine as well as unhydrogenated nut butters. The results showed 12.9% increase in the use of trans fatty acid free margarine but no change in the other good sources of fat.

Kind of Meat

This question indicated one of the most increased areas of knowledge gained from the pretest to the posttest, because switching to low-fat or very lean meat can frequently result in lowering cholesterol and TG levels. There was an increase in the intake of high fat meats, especially red meats, in the posttest, which is not recommended in subjects known to have heart disease.

Number of Egg Yolks/week

This question addressed the number of egg yolks eaten weekly by the subjects. Egg yolk is very high in cholesterol, which increases the risk of heart disease, and limiting the amount of egg yolks is very important in trying to prevent or decrease further complications in people known to have heart disease. There was a 13% decrease in the intake of egg yolks in the posttest, which was a positive outcome.

Servings of Breads, Cereals/day

This question asked the number of servings of whole grains eaten daily by the subjects. It is recommended to consume whole grain breads and cereals and it is important to have at least five servings a day of these foods. A decrease of 5.5% in grains intake was noted after the cardiac rehabilitation program, although an increase in those products is desirable.

Servings of Nuts, Seeds/week

This question was important because most nuts and seeds can elevate cholesterol and LDL and can increase the risk of heart disease. It was important for the subjects to realize that fat comes from butter or margarine but also from certain oils which are mainly used in cooking and especially in preparing all kinds of nuts and seeds. A 2.6% decrease in intake of nuts was noted after cardiac nutrition education, and this result is good for people known to have high cholesterol level.

Highly Refined Foods and Snacks/day

As seen in the previous question, the results here also showed an increase in the intake of highly refined foods and snacks by 2.6%. This is not very appreciated because some snacks including chips, contain a lot of salt, which can increase the risk of heart problems by increasing blood pressure.

Add Salt to foods and eat Salty Foods

This question was one of the most important indicators of cardiac problems as an increased sodium intake leads to increases in blood pressure which can increase the risk of heart disease especially in people known to already have high blood pressure. A 5.5% decrease in salt was noted in the posttest, which was very good.

Caffeinated Beverages/day

Caffeine is a heart stimulant and a decrease in caffeine is important to help improve heart function. This question asked about the caffeinated beverages that subjects drink daily. A 3.7% decrease in caffeine was noted as a positive result because caffeine can increase blood pressure, leading to an increase in the risk of heart disease.

Type of Meals out

This question addressed the type of meals subjects usually ask for when dining out. Many elderly are not able to prepare their own foods, they tend to go out to eat and for most a fast-food place is the cheapest and the easiest way to go. It is important to remember that fast-food restaurants offer meals with a very high content of fat and sodium, which lead to an increase in serum cholesterol and TG, increasing the risk of heart attack. In the nutrition classes that participants attended, healthy diet and healthy heart were emphasized. Subjects are recommended to eat healthy foods and are shown how to prepare healthy meals through recipes that are given to them. In addition, they are taught about fat content of the foods eaten out and advised not to eat in fast-food restaurants or choose healthy items when eating in those places. This question indicated one of the most increased area of understanding gained from the lessons that participants have been through regarding nutrition and healthy food choices. An increase in the mean statistic indicated a 6.7% decrease in meals eaten away from home, which is a very good result as most of the meals eaten out contain large amounts of salt and fat.

Alcohol Beverages/week

As caffeine, alcohol is also a heart stimulant, but has also been proven to be beneficial for the heart when taken in small amounts. As shown in previous studies, alcohol is still not recommended in people known to have heart disease. Here again, there was a decrease in alcohol intake by 5.6% after cardiac rehabilitation, which is a good result, although a small amount of alcohol daily has been proven to decrease the risk of heart problems.

Days of 30 min Physical Exercise/week, Time of Moderate Activities/week, Time of Vigorous Activities/week

Physical exercise has been proven to improve the heart function, and it is important that people exercise for at least 30 minutes to one hour three times a week. The results showed a great improvement in physical exercise, time of moderate activities, and time of vigorous activities, as answered by the subjects. This is mainly because participants in the cardiac rehabilitation program are required to come three times a week for one-hour exercise on available equipment in the facility and will also be recommended to pursue exercise training at home on their own machines or do some other activities of their own. The subjects seemed to be exercising more after cardiac rehabilitation, at least a 25% increase in activity, which was very positive.

Present Smoking Practices

Along with caffeine and alcohol, smoking is detrimental to the heart as it increases the risk of heart attack especially in people known to have high blood pressure because smoking leads to deterioration and clogging of the arteries of the heart. People with heart disease are advised not to smoke at all and try to stop smoking or at least decrease their use of cigarettes. A 4% decrease in cigarette smoking was reported among the subjects, which was very favorable in decreasing the risk of heart disease.

Lifestyles

This question was very important because it reflects subjects' willingness to change and studies their adherence to cardiac nutrition classes. There were 23.3% of subjects who have been making lifestyle changes for six months or more, while only 3.3% show no present interest in making lifestyle changes. Forty percent recently started implementing changes, which is quite significant, compared to 30% who were making plans to achieve the changes.

Barriers

This last question of the posttest was important to determine what were the problems that subjects encounter, which might prevent them from meeting their goals towards lifestyle improvement. Out of 33 subjects, it was found that only 7 were able to answer this question, and all had different opinions (Table 3).

Categories of Variables

Although the categories include different variables, it is important to note the overall percent change in the use of the items listed under each category. The percent change indicates an increase or a decrease in the use of the items for each category. This can be explained as an overall positive change in the items indicated because all variables were recoded with the best score attributed to the best answer. The mean statistic can better describe the results as an increase in the mean was found for every category (Table 4).

Variables	Pretest		Posttest		Percent change
	N	Mean Statistic	N	Mean Statistic	
Fats	30	0.8	32	0.87	8%
Nutrition	24	29.62	27	30.22	1.98%
FrtVeg	32	4.78	32	5.28	9.46%
Exercise	30	3.46	31	5.09	32.02%
Health	22	40.36	25	43	6.13%

Fats: Butter + Stick Margarine + Trans fatty acid free margarine + Oil + Vegetable oils (olive, canola, soy) + Shortening + Peanut butters + Olives

Nutrition: Skip breakfast + Vegetable + Beans + Fruits + Dairy + Meat + Egg yolk + Grains + Nuts + Snacks + Salt + Caffeine + Water + Eat out + Fats

FrtVg: Fruits + Vegetables + Beans

Exercise: Physical + Moderate + Vigorous

Health: Nutrition + Exercise + Alcohol + Secondhand smoke + Smoking

The means for test scores with gender differences indicate an improvement in both males and females. The results are more significant in females compared to males in all the categories listed except for exercise, as seen in Table 5.

Category	Pretest	Posttest	Pretest	Posttest	Pretest v/s Posttest Statistical Significance
	Males	Males	Females	Females	
Nutrition	29.78	29.36	29	34	Yes in both genders
Fats	0.75	0.76	1	1.33	Yes in both genders
Exercise	3.54	5.34	3.16	3.8	Yes in both genders
Fruit & Vegetables	4.84	4.76	7.16	4.83	Yes in both genders
Health	41.22	42.09	36.5	47.75	Yes in both genders

A comparison of the data from both tests is significant in showing changes in the categories of variables as illustrated in Table 6. The overall means for test scores by paired samples statistics indicate that both the pretest and the posttest were statistically significant with a p-value of <0.05 for paired t-test. However, a small decrease in the intake of fruits and vegetables was noted in the posttest compared to the pretest. This could be explained by a decrease in the means as seen in the previous table with a slight decrease in fruits and vegetables intake in males compared to females.

Category	Pretest	Posttest	p-value for paired t-test	Statistical Significance
Nutrition	29.84	30.68	<.05	Yes
Fats	0.79	0.89	<.05	Yes
Exercise	3.51	5.2	<.05	Yes
Fruit & Vegetables	5.16	4.77	<.05	Yes
Health	40.52	43.7	<.05	Yes

CHAPTER 5

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Discussion

After analysis of the data collected from the pretests and the posttests, it is noted that subjects participating in cardiac rehabilitation program increased their knowledge of many important factors that can help lower their risk of heart disease and are willing to make dietary changes to improve their disease. A comparison of the data from both tests is significant in showing changes in the amount of food items attributed in each question as answered by the participants. However, not all subjects showed improvements in all the questions, with some people eating more unhealthy foods than previously. Possible explanations to this difference in how the subjects responded to this program by changing their eating habits include: 1) the availability of foods or the type of foods that the subjects can afford to buy, with some kinds being cheaper than others, especially when talking about healthy choices; or 2) lack of adherence to the recommendations. But, overall, a potentially useful change in the eating habits of these respondents was observed. This improvement was seen in both genders with results more significant in females compared to males except for exercise. Again, we note that only 7 females participated in the study with the rest, 26, being males.

Although participants were aware of the importance of eating larger amounts of fruits and vegetables, there was only a 13% increase in the intake of fruits, and a 3% increase in the intake of vegetables. This can be explained again through the fact that fruits and vegetables are more expensive to buy than other food items, or that they are not as tasty as meat and other fatty foods.

Regarding alcohol intake, there was a very significant decrease intake by about 50% for subjects who used to drink. Some who used to drink up to seven alcohol beverages per week reported to cut down to none.

Interestingly, there was only a 4% decrease in the number of subjects who smoke, which was a good number when considering the difficulty of quitting tobacco. However, this number is still low and the rehabilitation program should be aiming for

more smoking cessation.

Regarding fat intake, 24 subjects changed their intake of fats and high fatty foods, with four people adding canola oil and olive oil to their diet, while they never used those oils before this program. Only seven people were still using oils (other than canola oil and olive oil) and butter in their cooking. Two participants mentioned using canola oil and olive oil in their food in the posttest, but it is not known if they were using those oils before.

One of the major and most important questions was: “Are you ready to make lifestyle and dietary changes?” Despite their ability to follow nutrition classes and understanding the material provided to them, the subjects might not be ready to improve yet or are afraid of making those changes in their lives. Through the stages of behavior changes, this area of readiness was discussed by the fact that motivation plays an important role in people’s readiness to change. According to the data, one subject answered that he was not interested in making lifestyle and dietary changes, while another was thinking of making a change. Nine subjects answered that they were making plans to achieve those changes, but they are not ready yet. Twelve subjects started implementing those changes while seven have been doing this for six months or more. Three subjects did not answer this question. Overall, among the 33 participants studied, 29 were in the process of making a change or had already changed their lifestyle, which is statistically and medically significant. This indicates that subjects can increase knowledge from the cardiac rehabilitation classes and that they can make lifestyle changes to improve their health.

Conclusions

The subjects participating in the cardiac rehabilitation program and nutrition classes in this study were successful in incorporating changes in their dietary behaviors. Therefore, the null hypothesis was rejected. This confirms that cardiac rehabilitation programs play an important role in individuals with heart disease as a tertiary prevention. This has been proven in other studies to decrease the risk of having another cardiovascular event (11, 17, 19). Providing nutrition classes within the cardiac

rehabilitation program was found to be an effective way to help the subjects understand what causes cardiovascular disease and follow the ways to prevent further complications in their disease; this is particularly important when CVD is, and has been for the last few decades, the leading cause of death in the United States.

CVD rates have been proven to be high in the United States as seen in many studies (1, 2). Cardiac rehabilitation programs have been an effective method of helping people develop positive physical and lifestyle changes. It is important to highlight the results of this study as they showed positive effects of the cardiac rehabilitation program to improve and help implement lifestyle changes after a cardiac event. Because CVD has been proven to affect peoples of all ages, not only the elderly, it would be beneficial to provide information to adolescents and young adults about lifestyle changes so they can start making changes in their lifestyle and dietary habits to prevent cardiac problems in the future.

Recommendations

Despite these interesting results, the scope of this research and the time allowed for its completion did not permit follow-up. It would be necessary to follow the subjects for another three-month period, or longer, and see how much progress they make following rehabilitation, and if they are still interested in making changes and improving their health. One of the major issues is whether they will continue exercising and whether they will quit smoking permanently. An indicator of the success of this program would be if after a few years of continuous education and follow-up, the rate of CVD in this specific region declined. Of course, many studies conducted in various hospitals in Northeast Tennessee would be needed to study this hypothesis.

Nutrition education provided by various health professionals may not be as accurate and concise as if provided by the registered dietitian who knows what areas to emphasize and address in the most effective manner.

REFERENCES

1. Bonow RO, Smaha LA, Smith SC Jr, Mensah GA, Lenfant C. World Heart Day 2002: the international burden of cardiovascular disease: responding to the emerging global epidemic. *Circulation*. 2002 Sep 24;106(13):1602-5.
2. Cavallaro V, Dwyer J, Houser RF, Shores K, Canez I, Hong A, Altman K, Helmick E, Murphy JN. Influence of dietitian presence on outpatient cardiac rehabilitation nutrition services. *J Am Diet Assoc*. 2004 Apr;104(4):611-4.
3. Davis LA, Chesbro SB. Integrating health promotion, patient education, and adult education principles with the older adult: a perspective for rehabilitation professionals. *J Allied Health*. 2003 Summer;32(2):106-9.
4. Pasquali SK, Alexander KP, Peterson ED. Cardiac rehabilitation in the elderly. *Am Heart J*. 2001 Nov;142(5):748-55.
5. Blackburn GG, Foody JM, Sprecher DL, Park E, Apperson-Hansen C, Pashkow FJ. Cardiac rehabilitation participation patterns in a large, tertiary care center: evidence for selection bias. *J Cardiopulm Rehabil*. 2000 May-Jun;20(3):189-95.
6. Forman DE, Farquhar W. Cardiac rehabilitation and secondary prevention programs for elderly cardiac patients. *Clin Geriatr Med*. 2000 Aug;16(3):619-29.
7. Brennan A. Efficacy of cardiac rehabilitation. 1: A critique of the research. *Br J Nurs*. 1997 Jun 26-Jul 9;6(12):697-702.
8. Worcester MU, Stojcevski Z, Murphy B, Goble AJ. Long-term behavioral outcomes after attendance at a secondary prevention clinic for cardiac patients. *J Cardiopulm Rehabil*. 2003 Nov-Dec;23(6):415-22.
9. Todaro JF, Shen BJ, Niaura R, Tilkemeier PL, Roberts BH. Do men and women achieve similar benefits from cardiac rehabilitation? *J Cardiopulm Rehabil*. 2004 Jan-Feb;24(1):45-51.
10. Timlin MT, Shores KV, Reicks M. Behavior change outcomes in an outpatient cardiac rehabilitation program. *J Am Diet Assoc*. 2002 May;102(5):664-71.

11. Lavie CJ, Milani RV. Benefits of cardiac rehabilitation and exercise training programs in elderly coronary patients. *Am J Geriatr Cardiol*. 2001 Nov-Dec;10(6):323-7.
12. Squires RW, Gau GT, Miller TD, Allison TG, Lavie CJ. Cardiovascular rehabilitation: status, 1990. *Mayo Clin Proc*. 1990 May;65(5):731-55.
13. Mosby's Medical, Nursing, & Allied Health Dictionary. Sixth Edition. Copyright 2002 by Mosby, Inc.
14. Daly J, Sindone AP, Thompson DR, Hancock K, Chang E, Davidson P. Barriers to participation in and adherence to cardiac rehabilitation programs: a critical literature review. *Prog Cardiovasc Nurs*. 2002 Winter;17(1):8-17.
15. Frame CJ, Green CG, Herr DG, Taylor ML. A 2-year stage of change evaluation of dietary fat and fruit and vegetable intake behaviors of cardiac rehabilitation patients. *Am J Health Promot*. 2003 Jul-Aug;17(6):361-8.
16. Vonder Muhll I, Daub B, Black B, Warburton D, Haykowsky M. Benefits of cardiac rehabilitation in the ninth decade of life in patients with coronary heart disease. *Am J Cardiol*. 2002 Sep 15;90(6):645-8.
17. Lavie CJ, Milani RV. Benefits of cardiac rehabilitation and exercise training. *Chest*. 2000 Jan;117(1):5-7.
18. Yates BC, Braklow-Whitton JL, Agrawal S. Outcomes of cardiac rehabilitation participants and nonparticipants in a rural area. *Rehabil Nurs*. 2003 Mar-Apr;28(2):57-63.
19. Wright DJ. Cardiac rehabilitation: are the potential benefits being realized? *Hosp Med*. 1999 Feb;60(2):119-22.
20. Roblin D, Diseker RA 3rd, Orenstein D, Wilder M, Eley M. Delivery of outpatient cardiac rehabilitation in a managed care organization. *J Cardiopulm Rehabil*. 2004 May-Jun;24(3):157-64.
21. McSherry R, Benison D, Shaw S, Davies A. The advantages of cardiac rehabilitation. *Prof Nurse*. 1999 Jun;14(9):612-5.

22. Pelletier S, Kundrat S, Hasler CM. Effects of a functional foods nutrition education program with cardiac rehabilitation patients. *J Cardiopulm Rehabil.* 2003 Sep-Oct;23(5):334-40.
23. Egan F. Cardiac rehabilitation into the new millennium. *Intensive Crit Care Nurs.* 1999 Jun;15(3):163-8.
24. Song R, Lee H. Managing health habits for myocardial infarction (MI) patients. *Int J Nurs Stud.* 2001 Aug;38(4):375-80.
25. Montgomery DA, Amos RJ. Nutrition information needs during cardiac rehabilitation: perceptions of the cardiac patient and spouse. *J Am Diet Assoc.* 1991 Sep;91(9):1078-83.
26. Koikkalainen M, Mykkanen H, Julkunen J, Saarinen T, Lappalainen R. Changes in eating and weight control habits after myocardial infarction. *Patient Educ Couns.* 2002 Feb;46(2):125-30.
27. Wasling C. Role of the cardioprotective diet in preventing coronary heart disease. *Br J Nurs.* 1999 Oct 14-27;8(18):1239-48.
28. Iso H, Rexrode KM, Stampfer MJ, Manson JE, Colditz GA, Speizer FE, Hennekens CH, Willett WC. Intake of fish and omega-3 fatty acids and risk of stroke in women. *JAMA.* 2001 Jan 17;285(3):304-12.
29. Hu FB, Willett WC. Diet and coronary heart disease: findings from the Nurses' Health Study and Health Professionals' Follow-up Study. *J Nutr Health Aging.* 2001;5(3):132-8.
30. U.S Department of Agriculture-U.S. Department of Health and Human Services. Nutrition and your health: Dietary guidelines for Americans. *Homes and Garden Bulletin No. 232.* Washington, DC. U.S. Printing Office 2000.
31. Mensink RP, Katan MB. Effect of dietary fatty acids on serum lipids and lipoproteins: a meta-analysis of 27 trials. *Arterioscler Thromb.* 1992 Aug;12(8):911-9.
32. Parks EJ, Hellerstein MK. Carbohydrate-induced hypertriglycerolemia: historical perspective and review of biological mechanisms. *Am J Clin Nutr.* 2000 Feb;71(2):412-33.

33. Solomon CG, Hu FB, Stampfer MJ, Colditz GA, Speizer FE, Rimm EB, Willett WC, Manson JE. Moderate alcohol consumption and risk of coronary heart disease among women with type 2 diabetes mellitus. *Circulation*. 2000 Aug 1;102(5):494-9.
34. Valmadrid CT, Klein R, Moss SE, Klein BE, Cruickshanks KJ. Alcohol intake and the risk of coronary heart disease mortality in persons with older-onset diabetes mellitus. *JAMA*. 1999 Jul 21;282(3):239-46.
35. Ajani UA, Gaziano JM, Lotufo PA, Liu S, Hennekens CH, Buring JE, Manson JE. Alcohol consumption and risk of coronary heart disease by diabetes status. *Circulation*. 2000 Aug 1;102(5):500-5.

APPENDICES

APPENDIX A
PRETEST

Survey On Eating Habits

(Distributed by the Cardiac Rehabilitation Center at JCMC)

Please answer the following questions based on your eating habits.

Remember breakfast, lunch, dinner, snacks, and eating out.

1. Indicate your present smoking practices

- a) Never smoked
- b) Quit smoking within last year
- c) Quit smoking more than a year ago
- d) Currently smoke cigarettes
- e) Smoke a pipe or cigar only

2. Are you exposed to secondhand smoke regularly at home or at work?

- a) Yes
- b) No

3. How many days per week do you accumulate at least 30 minutes of physical activity such as brisk walking, cycling, jogging, swimming, active gardening, or active sports?

- a) No regular exercise
- b) One
- c) Two
- d) Three to four
- e) Five or more

4. How much time each week do you spend doing moderate-activities (e.g. brisk walking, bike up to 10 mph, aerobic dance, etc.)?

- a) No regular activity
- b) ½ hour
- c) 1 hour
- d) 2 hours
- e) 3-4 hours
- f) 5+ hours

5. How much time each week do you spend doing vigorous-activities (e.g. running, biking 12+ mph, active sports)?

- a) No regular vigorous activity
- b) ½ hour
- c) 1 hour

- d) 2 hours
- e) 3-4 hours
- f) 5+ hours

6. Has a doctor restricted your activity for health reasons?

- a) Yes
- b) No

(if yes, explain) _____

7. Do you often skip breakfast or other meals?

- a) Yes
- b) No

8. How many servings of whole grain breads or cereals do you eat daily (serving = 1 slice bread, 1 C dry cereal, ½ C cooked cereal, ½ C brown rice)?

- a) None
- b) One
- c) Two
- d) Three
- e) Four
- f) Five +

9. How many servings of fruit do you usually eat each day (1 serving = 1 cup fresh, ½ C cooked, 6 oz juice)?

- a) None
- b) One
- c) Two
- d) Three
- e) Four
- f) Five +

10. How many servings of vegetables do you usually eat daily (1 serving = 1 cup raw, ½ C cooked, 6 oz vegetable juice, 1 medium salad)?

- a) None
- b) One
- c) Two
- d) Three
- e) Four
- f) Five +

11. How many times a day do you eat highly refined foods and typical snacks (soda pop, chips, fries, pastry, cookies, cake, or other sweets)?

- a) None
- b) One
- c) Two
- d) Three
- e) Four
- f) Five +

12. Mark any of the fats or high fat foods below that you typically eat (including those used in cooking)

- a) Butter
- b) Stick margarine
- c) Trans fatty acid free margarine
- d) Oil based salad dressing or mayonnaise
- e) Vegetable oils (e.g. olive, canola, soy)
- f) Shortening, lard, or meat drippings
- g) Nuts, seeds, or unhydrogenated nut butters
- h) Olives or avocados

13. What kind of meat do you usually eat?

- a) Primarily red meats including steak, hamburger, hot dog, bacon, sausage, or fried chicken
- b) Seldom eat red meat or limit it to only lean cuts, or eat skinless poultry, or fish
- c) Seldom eat any meats, eat primarily meatless entrees (vegetarian protein foods)

14. How many egg yolks do you eat each week (including those in cooking)?

- a) None
- b) One
- c) Two
- d) Three
- e) Four
- f) Five +

15. How many servings of nuts, seeds, or unhydrogenated nut butters do you eat weekly (serving – 1 oz. of nuts or seeds or 2T nut butter)?

- a) None
- b) One
- c) Two
- d) Three

- e) Four
- f) Five +

16. What type of dairy products do you normally use?

- a) Regular milk, yogurt, cheese, sour cream
- b) Only nonfat dairy products (or no dairy)
- c) Use both of above

17. How many servings (2/3C) of beans, split peas, or soybeans do you eat weekly?

- a) None or less than one
- b) 1 or 2
- c) 3 or more

18. Do you often add salt to your food at the table and frequently eat salty foods (pickles, soy sauce, chips)?

- a) Yes
- b) No

19. How many caffeinated beverages do you drink daily (coffee, tea, cola drinks)?

- a) None
- b) One
- c) Two
- d) Three
- e) Four
- f) Five +

20. Number of glasses you drink daily?

- a) Less than 3
- b) 3 to 5
- c) 6 to 7
- d) 8 or more

21. When you eat out, what type of meals do you typically order?

High fat meals: fast food steak, fried chicken, foods with rich sauces, sour cream, cheese, and rich desserts

Or healthier meals: lower in fat, and more vegetables, grains and fruits?

- a) Mostly high fat meals
- b) Mostly healthier meals or seldom eat out

c) Eat both kinds about the same

22. How many alcohol containing beverages do you drink in a typical week (1 drink = 12 oz. beer, 5.5 oz. wine, or 1.5 oz. liquor)?

a) Seldom or never drink these beverages

b) Up to 7

c) Up to 14

d) More than 14

23. Indicate any change in weight since you were about 21 years old

a) Have not gained or gained less than 10 pounds

b) Have gained 10 to 19 pounds

c) Have gained 20 to 29 pounds

d) Have gained 30 or more pounds

APPENDIX B
POSTTEST

Survey On Eating Habits

Please answer the following questions based on your eating habits since you have had the cardiac class education. Remember breakfast, lunch, dinner, snacks, and eating out.

1. Do you often skip breakfast or other meals?

- a) Yes
- b) No

2. How many servings of vegetables do you usually eat daily (1 serving = 1 cup raw, ½ C cooked, 6 oz vegetable juice, 1 medium salad)?

- a) None
- b) One
- c) Two
- d) Three
- e) Four
- f) Five +

3. How many servings (2/3C) of beans, split peas, or soybeans do you eat weekly?

- a) None or less than one
- b) 1 or 2
- c) 3 or more

4. How many servings of fruit do you usually eat each day (1 serving = 1 cup fresh, ½ C cooked, 6 oz juice)?

- a) None
- b) One
- c) Two
- d) Three
- e) Four
- f) Five +

5. What type of dairy products do you normally use?

- a) Regular milk, yogurt, cheese, sour cream
- b) Only nonfat dairy products (or no dairy)
- c) Use both of above

6. Mark any of the fats or high fat foods below that you typically eat (including those used in cooking)

- a) Butter
- b) Stick margarine
- c) Trans fatty acid free margarine
- d) Oil based salad dressing or mayonnaise
- e) Vegetable oils (e.g. olive, canola, soy)
- f) Shortening, lard, or meat drippings
- g) Nuts, seeds, or unhydrogenated nut butters
- h) Olives or avocados

7. What kind of meat do you usually eat?

- a) Primarily red meats including steak, hamburger, hot dog, bacon, sausage, or fried chicken
- b) Seldom eat red meat or limit it to only lean cuts, or eat skinless poultry, or fish
- c) Seldom eat any meats, eat primarily meatless entrees (vegetarian protein foods)

8. How many egg yolks do you eat each week (including those in cooking)?

- a) None
- b) One
- c) Two
- d) Three
- e) Four
- f) Five +

9. How many servings of whole grain breads or cereals do you eat daily (serving = 1 slice bread, 1 C dry cereal, ½ C cooked cereal, ½ C brown rice)?

- a) None
- b) One
- c) Two
- d) Three
- e) Four
- f) Five +

10. How many servings of nuts, seeds, or unhydrogenated nut butters do you eat weekly (serving – 1 oz. of nuts or seeds or 2T nut butter)?

- a) None
- b) One
- c) Two
- d) Three

- e) Four
- f) Five +

11. How many times a day do you eat highly refined foods and typical snacks (soda pop, chips, fries, pastry, cookies, cake, or other sweets)?

- a) None
- b) One
- c) Two
- d) Three
- e) Four
- f) Five +

12. Do you often add salt to your food at the table and frequently eat salty foods (pickles, soy sauce, chips)?

- a) Yes
- b) No

13. How many caffeinated beverages do you drink daily (coffee, tea, cola drinks)?

- a) None
- b) One
- c) Two
- d) Three
- e) Four
- f) Five +

14. Number of glasses you drink daily?

- a) Less than 3
- b) 3 to 5
- c) 6 to 7
- d) 8 or more

15. When you eat out, what type of meals do you typically order?

High fat meals: fast food steak, fried chicken, foods with rich sauces, sour cream, cheese, and rich desserts

Or healthier meals: lower in fat, and more vegetables, grains and fruits?

- a) Mostly high fat meals
- b) Mostly healthier meals or seldom eat out
- c) Eat both kinds about the same

16. How many alcohol containing beverages do you drink in a typical week (1 drink = 12 oz. beer, 5.5 oz. wine, or 1.5 oz. liquor)?

- a) Seldom or never drink these beverages
- b) Up to 7
- c) Up to 14
- d) More than 14

17. Indicate any change in weight since you were about 21 years old

- a) Have not gained or gained less than 10 pounds
- b) Have gained 10 to 19 pounds
- c) Have gained 20 to 29 pounds
- d) Have gained 30 or more pounds

18. How many days per week do you accumulate at least 30 minutes of physical activity such as brisk walking, cycling, jogging, swimming, active gardening, or active sports?

- a) No regular exercise
- b) One
- c) Two
- d) Three to four
- e) Five or more

19. How much time each week do you spend doing moderate-activities (e.g. brisk walking, bike up to 10 mph, aerobic dance, etc.)?

- a) No regular activity
- b) ½ hour
- c) 1 hour
- d) 2 hours
- e) 3-4 hours
- f) 5+ hours

20. How much time each week do you spend doing vigorous-activities (e.g. running, biking 12+ mph, active sports)?

- a) No regular vigorous activity
- b) ½ hour
- c) 1 hour
- d) 2 hours
- e) 3-4 hours
- f) 5+ hours

21. Has a doctor restricted your activity for health reasons?

a) Yes

b) No

(if yes, explain) _____

22. Indicate your present smoking practices

a) Never smoked

b) Quit smoking within last year

c) Quit smoking more than a year ago

d) Currently smoke cigarettes

e) Smoke a pipe or cigar only

23. Are you exposed to secondhand smoke regularly at home or at work?

a) Yes

b) No

24. Did you get ready to make lifestyle changes to improve your health?

a) No present interest in making any lifestyle change

b) Thinking about making a lifestyle change

c) Making plans to achieve this change

d) Recently started implementing this change

e) Have been doing this for 6 months or more

25. If you haven't met your goals, what are the problems or barriers that you have encountered?

APPENDIX C
STATISTICAL ANALYSIS

Statistics-Tables

A: Pretest

B: Posttest

Nutrition: Skip breakfast + Vegetable + Beans + Fruits + Dairy + Meat + Egg yolk + Grains + Nuts + Snacks + Salt + Caffeine + Water + Eat out + Fats

Fats: Butter + Stick Margarine + Trans fatty acid free margarine + Oil + Vegetable oils (olive, canola, soy) + Shortening + Peanut butters + Olives

FrtVg: Fruits + Vegetables + Beans

Exercise: Physical + Moderate + Vigorous

Health: Nutrition + Exercise + Alcohol + Weight change + Secondhand smoke + Smoking

t-test overall results for Categories of variables in both Pretest and Posttest with and without Gender Comparison

Group Statistics

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
A_NUTRI	1	19	29.7895	4.10391	.94150
	2	5	29.0000	7.03562	3.14643

Group Statistics

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
B_NUTRI	1	22	29.3636	4.14666	.88407
	2	5	34.0000	2.34521	1.04881

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	A_NUTRI	29.8421	19	5.09099	1.16795
	B_NUTRI	30.6842	19	4.12381	.94607

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	A_NUTRI & B_NUTRI	19	.027	.914

Group Statistics

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
A_FATS	1	24	.7500	.73721	.15048
	2	6	1.0000	.00000	.00000

Group Statistics

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
B_FATS	1	26	.7692	.76460	.14995
	2	6	1.3333	.51640	.21082

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	A_FATS	.7931	29	.67503	.12535
	B_FATS	.8966	29	.77205	.14337

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	A_FATS & B_FATS	29	.369	.049

Group Statistics

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
A_EXERC	1	24	3.5417	3.36192	.68625
	2	6	3.1667	2.92689	1.19490

Group Statistics

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
B_EXERC	1	26	5.3462	2.86974	.56280
	2	5	3.8000	2.86356	1.28062

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	A_EXERC S	3.5172	29	3.28003	.60909
	B_EXERC S	5.2069	29	2.92012	.54225

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	A_EXERC S & B_EXERC S	29	.160	.407

Group Statistics

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
A_FRTVG	1	26	4.7692	1.42289	.27905
	2	6	4.8333	1.16905	.47726

Group Statistics

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
B_FRTVG	1	26	4.8462	2.20349	.43214
	2	6	7.1667	1.60208	.65405

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	B_FRTVG	5.1613	31	2.20751	.39648
	A_FRTVG	4.7742	31	1.38347	.24848

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	B_FRTVG & A_FRTVG	31	.198	.286

Group Statistics

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
A_HEALT	1	18	41.2222	5.69371	1.34202
	2	4	36.5000	12.15182	6.07591

Group Statistics

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
B_HEALT	1	21	42.0952	6.57195	1.43412
	2	4	47.7500	6.23832	3.11916

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	A_HEALT	40.5294	17	7.70647	1.86909
	B_HEALT	43.7059	17	6.70601	1.62645

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	A_HEALT & B_HEALT	17	-.373	.140

VITA

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East Tennessee State University, Johnson City, Tennessee;

Clinical Nutrition, M.S., 2004

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Saint-George Hospital, Ashrafieh, Lebanon, 2000-2001

Tuition Scholarship, East Tennessee State University, Department of
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