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Efficacy of Nutrition Education within a Cardiac Rehabilitation Program on Eliciting Heart Healthy Diet Changes

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Abstract

Purpose: The purpose of this study was to determine if nutrition education classes taught by a Registered Dietitian Nutritionist (RDN) to cardiac rehabilitation patients improved dietary habits, specifically dietary fat intake.

Method: This retrospective chart review assessed changes in diet composition of participants enrolled in the cardiac rehabilitation program at University Hospitals Case Medical Center (UHCMC). Participants were offered nutrition education classes and the cardiac program administered the Diet Habit Survey, pre and post education. Participants were separated into groups A, B, C depending on the year they attended cardiac rehabilitation. The data was summarized using means ± standard deviation (SD). One way ANOVA and paired t test were used to compare baseline characteristics, sex and survey scores pre and post within groups. Data was analyzed using the JMP 11.1.1 software. Simple linear regression was used to assess the relationship between change in survey scores and number of classes attended. Spearman's Rho was used to calculate correlations between pre-survey scores and the number of classes attended.

Results: Participant's baseline characteristics, co-morbidities, entry diagnosis, survey scores and lipid panel were similar among all groups. The post survey scores improved in groups A, B, and C ($p \leq 0.001$, 0.007, 0.001) respectively. A change in survey score was not associated with number of classes attended among all groups combined ($p = 0.210$) nor among individuals assigned to the various participation groups. Categorical changes in % fat were not detected among groups A, B, or C or between sexes (p-value 0.307, 0.349, 0.646 respectively).

Conclusion: Nutrition education taught by a RDN can improve dietary habits of participants who attend cardiac rehabilitation programs.

Keywords: Nutrition; Rehabilitation; Diet; Saturated fats

Introduction

A leading cause of mortality in Americans is Coronary Artery Disease (CAD). It is estimated, that over 13 million Americans have survived a heart attack. Secondary prevention efforts have been established to help decrease disease progression. One of which includes, lifestyle modifications which have been shown to reduce the risk of future cardiac events including dietary changes such as reducing saturated fats and trans fat [1].

The relationships between consumption of total fat or specific types of fatty acids and heart health of cardiac patients have been well established. Overall, dietary recommendations typically suggest limiting total and saturated fat intake to help lower LDL cholesterol and reduce the risk of CAD [2-9]. The American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) even recommends dietary fat intake between 25% - 35% of total daily calories [10]. The state of the science overall suggests that current dietary recommendations can help reduce disease progression.

Data evaluating the efficacy of nutrition education within cardiac rehabilitation programs are limited, but at least one study has shown that nutrition education under the direction of a Registered Dietitian Nutritionist (RDN) can lead to long-lasting favorable changes in diet, body weight, and serum cholesterol [11]. Karvetti et al. [11] conducted a study where participants attended a rehabilitation center following a myocardial infraction to receive one and a half weeks of medical care, nutrition education, physical activation, an anti-smoking program and discussion of psychosocial problems. Their results found that the intervention group significantly diminished the intake of saturated fats, and the proportion of energy from fat decreased to the recommended 30% total calories from fat [11] Changes in food consumption were significant throughout the 10 year follow-up study in the intervention group when compared to the control [11]. This present study is similar as it examines the relationship between nutrition education and diet outcomes of cardiac rehabilitation patients.

Methods

Participants

Participants were selected from the University Hospitals Case Medical Center (UHCMC) cardiac rehabilitation program if they were considered by AACVPR and American Heart Association Adult Treatment Panel III (AHA ATP III) to have a high fat (≥ 30% of energy) intake (n = 138). Participants were excluded if they had incomplete surveys (n = 80). A total of 73 participants were included in the final analysis. This study was approved by the UHCMC Institutional Review Board and there is no conflict of interest.

Experimental design

This retrospective study used data from cardiac rehabilitation participants who attended nutrition classes during 2008-2012. All classes were taught by the same RDN and incorporated dietary guidelines of AHA ATP III and Therapeutic Lifestyle Change diet. Classes were thirty minutes in length, and evaluations were given to assess comprehension.

During 2008 to early 2012, twelve nutrition classes were provided as part of the cardiac rehabilitation program. The total number of cardiac rehabilitation classes attended was recorded, but the exact number of nutrition classes attended was not. Participants who attended > 18 total classes were categorized as having attended at least half of the nutrition classes (group A); since the total number of classes offered were 24. In late 2012, the curriculum was condensed at participants' request; thus, six nutrition classes were offered. An exact number of nutrition classes attended was recorded during this time. Group B subjects included these participants who were categorized as attending < 5 nutrition classes with 60% attending > 4 nutrition classes. The last group attended zero classes, and this group was used as a reference group (group C).

All participants were administered the Diet Habit Survey (DHS) pre- and post-nutrition education. The 40 question survey was created for the Family Heart Study [1]. Each question represents a certain value that when added collectively predicts the percent of energy from fat of the diet. This tool has been validated as a screening tool to only identify dietary fat intake [1]. The survey scores are categorically ranked from a very high fat diet (> 37% of energy) to very low fat diet of 10% of energy. Table 1 represents the categorical score and dietary fat intake used in the DHS.

This study examined the impact of nutrition education in participants with DHS fat scores indicating > 30% of energy intake was from fat. The aim was to investigate if nutrition education as taught by an RDN would change dietary fat as assessed by DHS in cardiac rehabilitation patients at a university medical center.

Category	Percent Fat (% of Total Kcal)	Total Survey Score (Male)	Total Survey Score (Women)
Category 1	> 37	< 170	< 147
Category 2	30	170-220	147-190
Category 3	25	221-227	191-235
Category 4	20	278-349	236-287
Category 5	10	350-389	288-330

Table 1: Diet habit survey categorical score and the dietary fat intake.

Statistical analysis

The data were summarized using means ± standard deviation (SD). One-way ANOVAs were used to compare baseline characteristics among groups and differences both before and after education by sexes. Paired t-tests were used to compare survey scores pre and post intervention within groups. Data were analyzed using the JMP 11.1.1 software. Simple linear regression was used to assess the relationship between change in survey scores and number of classes attended. Spearman's Rho was used to calculate correlations between pre-survey scores and the number of classes attended. Statistical significance was set at $p < 0.05$.

Results

Participants characteristics

Participants' baseline characteristics, co-morbidities and entry diagnosis were similar among all groups (Tables 2 and 3). There was a difference (p = 0.041*) in percentage of individuals reporting a family history of CAD among participant group assignments (Table 4).

	Group A (18+) N = 27	Group B (2012) N = 23	Group C (zero) N = 23	Total Participants N = 73	p-value
Age (years)	72.4 ± 10.0	72.8 ± 8.9	70.6 ± 9.5	72.0 ± 9.4	0.686
Sex (%)					
Male	40.74	60.87	65.2	61.64	0.907
Female	59.26	39.13	34.78	38.36	
Weight (kg)					
Pre	84.0 ± 38.8	84.0 ± 38.9	84.1 ± 40.4	93 ± 172.1	0.439
Post	81.2 ± 48.4	83.4 ± 39.8	83.3 ± 37.7	82.2 ± 42.1	0.807
Body Mass Index (BMI)					

Pre	28.8 ± 4.0	28.6 ± 4.6	29.5 ± 5.8	28.9 ± 4.8	0.792
Post	28.3 ± 4.1	28.5 ± 4.7	28.8 ± 5.5	28.5 ± 4.7	0.807
Sedentary Lifestyle (%)					
Yes	74.1	87	78.3	79.5	0.508
Stress (%)					
Yes	7.4	0	0	2.7	0.13
Smoker (%)					
Yes	11.1	8.7	8.7	9.6	0.945

Table 2: Baseline characteristics for cardiac rehabilitation participants.

	Group A (18+) (n = 27) %	Group B (2012) (n = 23) %	Group C (Zero) (n = 23) %	All Groups (n = 73) %	p-value
Coronary Artery Bypass Graft (CABAG)	22	40	40	33	0.51
Myocardial Infarction (MI)	33	26	13	25	0.331
Percutaneous Transluminal Coronary Angioplasty (PTCA)	33	22	40	32	0.421
Stable Angina (SA)	4	4	4	4	0.991
Valve Replacement (VR)	7	9	4	7	0.825

Table 3: Entry diagnosis for cardiac rehabilitation.

Certain terms listed above are outdated such as PTCA and angioplasty. Currently percutaneous coronary intervention replaces these former terms.

	Obesity %	Diabetes %	Hypertension %	Hyperlipidemia %	Family History %
Group A (18+) n = 27	3	2	82	89	19
Group B (2012) n = 23	13	30	9	91	35
Group C (zero) n = 23	30	35	9	100	57
Total n = 73	26	29	88	93	36
p-value	0.196	0.012	0.48	0.133	0.041

Table 4: Co-Morbidities and family history of male and female participants attending cardiac rehabilitation.

Diet habit survey scores and class attendance

Baseline scores were similar among all groups and no differences were detected between sexes. The mean DHS scores for men were 178.2 (SD = 37.6), 161.8 (SD = 35.7) and 174.4 (SD = 29.5) for groups A, B and C respectively. The mean scores for women were 179.1 (SD = 33.0), 166.3 (SD = 37.5) and 157.0 (SD = 20.2) for groups A, B and C groups respectively. The post survey scores improved in groups A, B and C ($p \leq 0.001$, 0.007*, 0.001) respectively (Figure 1). Categorical changes in % fat were not detected among groups A, B, or C or between sexes (p-value 0.307, 0.349, 0.646 respectively).

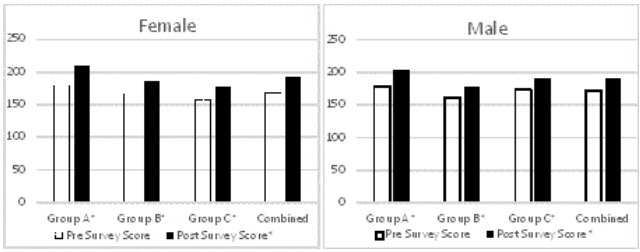

Figure 1: Numerical values from the DHS scores were recorded pre and post-cardiac rehabilitation. *Significant differences ($p < 0.05$) are denoted with (*).

A change in survey score was not associated with number of classes attended among all groups combined ($p = 0.210$) nor among individuals assigned to the various participation groups. Survey score changes were not related to the total number of classes attended among all groups ($r = 0.014$).

Lipid panel

The baseline lipid concentrations were similar among all groups. Low density lipoprotein (LDL) and triglyceride (TG) levels declined after cardiac rehabilitation for individuals assigned to each group ($p = 0.008$* and 0.003*) respectively (Table 5). No differences in lipid

panel between male and female participants among all groups were detected ($p \geq 0.05$).

Lipid Panel Pre / Post	Group A (18+)	Group B (2012)	Group C (Zero)	All Groups	p-value
Total Cholesterol (TC)					
Pre	159.3 ± 39.8	152.0 ± 49.9	154.9 ± 41.1	155.6 ± 43.1	0.836
Post	156.0 ± 41.0	141.2 ± 43.3	138.2 ± 31.5	145.7 ± 39.3	0.226
Low Density Lipoprotein Cholesterol (LDL-C)					
Pre	95.0 ± 30.3	79.0 ± 35.9	81.4 ± 36.3	85.7 ± 34.3	0.2
Post	91.3 ± 30.8	69.0 ± 29.9	69.1 ± 23.3	77.3 ± 30.0	0.008
High Density Lipoprotein Cholesterol (HDL-C)					
Pre	42.4 ± 12.6	45.9 ± 15.1	43.2 ± 14.7	43.7 ± 14.0	0.659
Post	42.3 ± 12.7	48.0 ± 17.5	42.9 ± 10.0	44.3 ± 13.8	0.292
Triglycerides (TG)					
Pre	106.8 ± 52.1	143.2 ± 65.1	178.0 ± 90.3	140.7 ± 75.3	0.453
Post	110.1 ± 48.6	123.6 ± 66.0	131.0 ± 64.5	120.9 ± 59.3	0.003

Table 5: Lipid panel pre and post entry into cardiac rehabilitation.

Discussion

Our findings support our hypothesis that nutrition education taught by an RDN during a cardiac rehabilitation program will improve DHS survey scores among participants with initial scores indicating ≥ 30% dietary energy is from fat. DHS scores improved in both higher and lower attending groups (A and B) with group A showing the greatest change in survey scores These data are similar to previous findings suggesting that nutrition education taught by a RDN, as part of a cardiac rehabilitation program, does influence changes in diet [12,13].

Our results indicate that despite changes in scores, there were no significant changes of categorical dietary fat intake among all groups. This result may be influenced by the fact that participants' baseline dietary fat intake was extremely high and the reality of decreasing total fat intake to achieve a change in categorical survey scores would be highly unlikely. Even though categorical change was not significant, dietary improvements were seen. Overall, there was a 47% improvement of DHS scores among all participants. Results indicate that 12% of participants prior to cardiac rehabilitation were following a diet consisting of ≤ 25% of energy from fat and after attending nutrition education classes 30% were following a diet providing ≤ 25% of energy from fat.

Number of classes attended was not associated with a change in total dietary fat among all participants. This may suggest that attending a more classes may improve diet. Further studies are needed to determine the number of nutrition classes needed to promote a positive change.

Among all groups, TG concentrations prior to entering cardiac rehabilitation were higher compared to after completion the program. Even though the present study was not aimed at lowering TG levels, dietary education and enrollment in cardiac rehabilitation may have influenced the reduction of TG levels in all groups. These differences may also be related to medication prescribed as a result of participating in cardiac rehabilitation.

In conclusion, nutrition classes taught by an RDN as part of a cardiac rehabilitation program improved dietary fat intake among participants. Further studies are needed to determine the total number of nutrition classes that may be needed to lower total dietary fat intake. As this study suggests, greater class attendance may be required to impact dietary changes.

Limitations

The primary limitation to this study is the small sample size. Given this was a retrospective study; many potential subjects had missing or incomplete data and therefore were excluded from the sample population. Another limitation of this study is the inability to collect information regarding medication prescriptions before, during, or after cardiac rehabilitation for all participants, drug therapy is generally considered effective in improving lipid profiles in cardiac patients. Since this was not controlled, it is likely that drug therapy most likely contributed to some improvements in lipids of participants in this study [14].

Finally, the class topics of the nutrition classes that each participant attended was not recorded. Further research is needed in this area to determine which class topics may be most beneficial for reducing total dietary fat.

Conclusion

In conclusion, nutrition education classes taught by an RDN as part of a cardiac rehabilitation program reduced dietary fat intake among participants. Further studies are needed to determine the total number of nutrition classes taught to achieve a lower dietary fat intake. As this study suggests, nutrition education improved dietary changes which

have been previously demonstrated to be beneficial among cardiac rehabilitation patients and should be included as part of a cardiac rehabilitation program.

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