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Nutritional Status of the Cardiac Patients Hospitalized in Cardiology Ward of Alzahra Hospital and its Comparison with Healthy Eating Index

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Abstract: Cardiovascular diseases are getting epidemic due to social reconstruction, technology advancement and over population in urban areas, inappropriate food habits and immobility. This study has tried to define the indexes of healthy nutrition in cardiac patients hospitalized in cardiac ward of Alzahra hospital and to compare it with Healthy Eating Index (HEI). Healthy Eating Index has been also designed to evaluate diet quality in different societies. This is a descriptive analytical study conducted cross-sectionally in cardiac patients hospitalized in cardiac ward of Alzahra hospital in Isfahan, Iran. Nutritional status was investigated by completing the last three days dietary Recalls. Nutritional index was calculated based on food pyramid guidelines, fat calorie percentage from total calorie, intake of saturated fats percentage and cholesterol, calcium, Iron and food variation. The range of this index was from 0-10 so the total score was 100. Calculation of this index was made with respect to the data of nutrition intakes compared to healthy food index. The score of food variation was defined by routine food intake in the society. The score of nutrition index was categorized into three groups of lower than 50 (weak), 51-80 (needs a change and improvement) and over 81 (good). Mean comparison test was used to compare healthy food index with nutrients intake and the number of servings of food pyramid guidelines. Mean age of cardiac patients was 65.5±7.9 and the nutrition index score were 36.3 in males and 35.7 in females. The intake servings from food pyramid in patients with good index score was significantly higher compared to other groups ($p<0.001$). Bread and cereal intake were as 8.6±1.8 serving, Vegetables 5±1.8, fruits 1.9±1 diary and milk product 1.4±0.5 and meat 1.6±1.1. There was an association between lipid intake and saturated fat percentage ($p<0.001$). Mean intake of fruit, milk and meat was less than HEI and for cholesterol, vegetables and salt, it was higher than HEI ($p<0.5$). Mean intake of cereal and saturated fats, were similar to HEI ($p>0.5$). Pearson correlation test showed that there was no significant association between age and nutrition variation, calcium, vegetables and bread ($p>0.5$). Level of education had a significant direct association with food variation, Iron, meat and fruit intake ($p<0.5$) but not with other items ($p<0.5$). 73.2% of diet should be changed and improved while in 3.3% it was good. 23.5% followed weak food pattern. Healthy food index is an appropriate tool to evaluate nutrition quality of cardiac patients. The diet in most of the cardiac patients needs improvement and changes in appropriate food education is essential.

Key words: Diet quality, healthy eating index, food guide pyramid

Introduction

Cardiovascular diseases are getting epidemic due to the social reconstruction, technology advancement and over population in urban areas, inappropriate food habits and immobility. Nutrition play an important role in the incidence of noncommunicable diseases (Variyam *et al*., 1998). Different surveys have mentioned the role of suboptimal dietary patterns in the incidence of mortality from obesity and over weight by USDA (2001). It is now well accepted that dietary imbalances are associated with noncommunicable diseases. Healthy diet has an important role in reducing the risk of obesity, hypertension, hypercholesterolemia. A great deal of work has been done to produce dietary recommendations for prevention of chronic diseases (Variyam *et al*., 1998). However, less attention has been focused on measures of overall diet quality.

Predominately, measuring dietary components is used to evaluate diet quality Hann *et al*., 2001. Dietary guidelines are designed to promote good health and reduce the risk of chronic diseases and the food guide pyramid has been produced to instruct people on how to follow guidelines day USDA, 2000. The healthy eating Index is a tool for evaluating how well people conform to dietary guidelines and the food guide pyramid. This index determines how well nutritional goals are met.

Dietary variety, as well as the amount of intake of the five food groups and fat consumption, make up the components of HEI. HEI score shows the compliance of adults to the dietary guidelines and food guide pyramid. Paying attention to the HEI score helps to prevent the incidence of under and over consumption (Ahluwalia and Lammi-Keefe, 1991) Since there are little information related to HEI in Iran. The aim of this study was to determine the indexes of healthy nutrition in cardiac patients hospitalized in cardiac ward of Alzahra hospital and to compare it with HEI.

Table 1: Five components of the Healthy Eating index (HEI) and the scoring criteria

	Criteria for perfect score of 10 (serving per day)	
Food groups	Men	Women
Grains	9.33±1.48	7.83±1.98
Vegetables	5.6±1.12	4.5±1.43
Fruits	1.6±0.97	1.1±1.0
Milk	1.2±0.46	1.5±0.62
Meat	1.9±1.18	1.2±1

Table 2: Descriptive data of the Cardiac patients in the study

	Men	Women
Energy intake (kcal/day)	2300	2000
Protein intake (g/day)	46±10	36±8
Fat intake (g/day)	51±20	49±21
Carbohydrate intake g/day	345±96	300±90
Healthy Eating Index	64±3	66±8
Body Mass index (kg/m^2)	24.9±3	22.3±3.7

Materials and Methods

This is a descriptive analytical study conducted cross sectionally in cardiac patients hospitalized in cardiac ward of Alzahra hospital in Isfahan-Iran. Dietary intake was assessed by three 24 hours recalls conducted by expert interviewers. The reliability and validity of 24 hour recalls have been proven in several studies (Gersocitz *et al.*, 1987 and Lammi-Keefe, 1991). The 24 hour dietary recall describes reported intakes from midnight to midnight, meal after meal. These 3 days were among usual days for subjects. Standard reference tables were used to convert portions to grams for computerization. Following coding of diaries, the dietary recall form was linked to a nurtient data base. For mixed dishes, food groups were calculated according to their ingredients. A design introduced by Kennedy *et al*. (1996) was used to calculate HEI. HEI was calculated based on Ten components, each component indicated different aspects of healthy diet. The first five components of the HEI were based on compliance with the United State Department of Agriculture (USDA) food Guide Pyramid recommendations for grains, vegetables, fruits, milk and meat groups are expressed in servings/day. As shown in Table 1, intakes at or above recommended amounts were awarded a food score of l0 points. conversely, persons consuming no servings within a food group received a score of zero. Between 0-10, the scores were calculated proportionately. The next four components of the HEI were adapted to the dietary guidelines for Americans. Components number 6 and 7 show the score of the percent related to consumed total fat and saturated fatty acids, respectively. Components 8 and 9 show the score of cholesterol intake and dietary variety. A full score of 10 points was awarded for diets with <30% energy form fat, <10% energy from saturated fat and <300mg cholesterol.

To assess dietary variety, the HEI score was calculated by counting the total number of different foods and food groups consumed over three days. Similar foods, such as two forms of white bread, were counted only once in the variety category. Mixtures were broken down into their component parts, so that a single item could contribute $2 points to the variety index. A score of O was given, if eight or fewer distinct foods were eaten over the three days period. A person was allocated a score of 10 if 18 or more different foods were eaten over the 3 days study period.

The scores between these two points were calculated proportionately. The score range of each component was 0-10. The sum score of the HEI was 100. The method of HEI score calculations was modified according to the USDA procedures (1992).

Body Mass Index (BMI) was measured by weight in kilograms divided by squared height in meters, Serum cholesterol, triglycerides and high-density lipoprotein (HDL) were measured in a blood sample taken 12 hours after fasting. Low density lipoprotein (LDL) was also calculated by Freidewald formule, 1972.

Statistical methods: HEI was reported as mean±SD. HEI score was categorized into three groups of, less than 50, 51-80 and more than 81, which called a “poor”, “needs improvement”, and“good“diet respectively Variyam *et al*., 1998; Hann *et al*., 2001; USDA, 2000.

Number of servings, number of food items according to HEI score category and analysis of covariance adjusted for energy intake, were used to compare nutrients Partial correlation was used to determine the relation between HEI, nutrients, the number of servings and variety adjusted for BMI and the level of serum lipids or energy intake.

Results

There were 16 men and 14 women in the 53-80 years age group. The mean BMI was 24.9±3.0 kg/m^2. The mean of HEI score was 64±3 for men and 66±8 for women. The mean age was 65.5±7.9 years in this population. Regarding education level, 26.7% of patients were illiterate and 36.7% were primary, middle and high school and university respectively. There was a significant difference in HEI between subjects with age-adjusted literacy levels beyond high school, as compared to those with lower education. Descriptive data are shown in Table 2. Differences in nutrient intake of various food guide pyramid groups across, HEI categories and the relationship between HEI and nutrient intake are shown in Table 3. Results showed that the number of servings intake from vegetables, fruits and milk was significantly higher in those with good diets compared to the others ($p<0.001$). In contrast, the percent of saturated fatty acids intake and amount of cholesterol consumed was lower in those with good diets compared to the others ($p<0.001$). The ratio of polyunsaturated fatty acids to saturated fatty acids (p/s) was different across the three group of HEI categories.

Table 3: B. Means and standard errors of dietary intakes across Healthy Eating Index (HEI) categories and dietary intake and variety

Variable	Poor diet HEI <50	Needs improvements HEI 51-80	Good diet HEI >81
Grains (Serving/day)	5.8	8.6±1.8	10.8
Vegetables (Serving/day)	1.5	5±1.8	8.4
Fruit (Serving/day)	1	1.9±1	4
Milk	1	1.4±1.1	3
Meat	0.5	1.6±1.1	3
Fat (% of energy)	32.86	31±3	27.1
Saturated fat (% of energy)	5.0	7.86±2.5	11
Cholesterol (mg/day)	1166	774	200
Carbohydrate (% of energy)	50	58	51
Protein (% of energy)	10	11	15
PUFA/SFA ratio	0.5	0.2	0.3
Variety	1.75	2.2	6.5
Sodium (mg)	5200	3028	2200

*PUFA/SFA-ratio of Polyunsaturated to saturated fatty acids

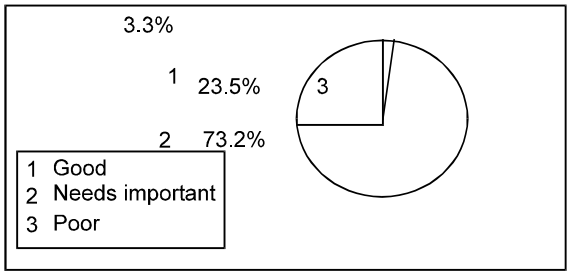

Fig. 1: Distribution of Cardic Patients according to the total Healthy Eating Index (HEI) Score

The number of food items comprising intake in patients with “good” diets was higher than the others ($p<0.05$). Energy intake was higher in “good” diets compared to the other two diets ($p<0.001$). The percent of carbohydrate intake in the group with an HEI of over 80 was higher than the other two groups ($p<0.005$). Protein intake was higher in “good” diets compared to the ‘needs improvement” group ($p<0.001$). Table 4 shows the frequency of patients according to the score of each component of HEI. The number of patients with ‘good” scores for intake of grains, vegetables and fruits groups as well as those with high variety score was much higher in contrast to the patients with ‘poor” score in consumption of dairy and meat groups. Fig. 1 shows the frequency of patients according to total HEI scores.

Discussion

The results of this study showed that the diets of most patients need improvement. There were relationship between nutrient intakes, the number of servings from each group and the number of food items consumed. As expected, HEI showed a negative association with total fat, saturated fat and cholesterol.

The American dietary guideline is more suitable according to the survey which shows the dietary shift in Iran. In this study, different levels of education had a positive relationship with HEI.

In the present study, patients with good diet indicated a higher number of servings as assessed by food guide pyramid, nutrient intake and the number of food item as compared to those with “needs improvement” and “poor” diets. This shows the importance of compliance with recommended dietary guidelines and the validity of HEI in measuring the quality of the diet. Other studies showed that a good diet has a HEI of 80 or higher. Recommended Dietary Allowances (RDA) Kennedy *et al*., 1996. We have found that the number of food group servings was in compliance with the recommended food guide pyramid except in the dairy and meat groups. This finding demonstrat that HEI and variety are closely associated to each other and HEI is a good tool for the assessment of dietary variety. Similar to the Hann *et al*., 2001 study. There was a significant positive correlation between HEI and the number of food groups, This result show the potential of HEI in assessing diet according to the food guide pyramid. In addition, the negative correlations between HEI and the percent of fat, saturated fat and the amount of cholesterol show the enhanced applicability of this index. In the present study, contradictory to some previous studies by Kennedy and USDA, 2000. all component of this index were calculated according to three days dietary recalls. In Previous studies, the dietary variety component was assessed on the basis of three day intake. Hence, another modification used in the present study was choosing the maximum and minimum percentage of food items consumed among the subjects.

Conclusion: In this study HEI is considered as, an appropriate tool for assessing the nutritional quality of patients diets. According to our findings patients with high education levels had higher HEI scores, compared to those having lower education levels. The number of food group servings was in compliance with the food guide pyramid, except in the dairy and meat groups, suggesting that patients may have inadequate intakes of meat and dairy products. In the present study, HEI

scores of more than 80 was associated with a higher number of food items consumed. This shows that dietary variety and dietary quality are closely associated with each other and HEI is a good indicator for both.

The greater percentage of patients failing to meet estimated average requirement (EAR) for macronutrients and micronutrients in the poor diet group compared to HEI scores less than 50 shows the importance of HEI in predicting diet quality. Three of the ten components (the percent of consumed total fat, saturated fatty acids and cholesterol intake) of the HEI score were correlated to total quality. Different kinds of fat intake had equal scores. Even though, different types of fatty acids which make up total fat intake have differing effects on the risk of chronic diseases according to the type of fat. Also, unsaturated fatty acids should be considered as a component of HEI because of the important role of these fatty acids in the health of the cardiovascular system.

In the present study, all components of HEI index were calculated according to three days of dietaty recalls.

The HEI score was these measured with 10 components. HEI score was considered to be 100. This study showed that the diet quality of most patient needs improvement therefor, a nutritional intervention to improve diet quality is needed.

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