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Original Research Article

Influence of Food Frequency on Lipid Profile of Young Cardiac Patients

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ABSTRACT

Cardiovascular diseases are a major cause of morbidity and mortality among the Indian population. Recent trends indicate that its prevalence has widely increased among the younger age group which has a serious economic impact. The aim was to study the influence of frequency of consumption of different foods on the lipid profile of young cardiac patients. A total of 100 patients in the age groups of 22-45 years, who had been admitted to Sri Jayadeva Institute of Cardiovascular Sciences and Research, Bengaluru, were selected for the study. Eighty nine per cent of the subjects were found to be non-vegetarians. Food frequency questionnaire reflected a low consumption of fruits and vegetables, and higher consumption of refined carbohydrates, and tea. None of the foods had a significant influence on the lipid parameters such as Total Cholesterol, VLDL, non-HDL, except rice. Frequency of rice consumption increased HDL cholesterol which is considered to be good cholesterol.

KEY WORDS: Dietary habits, young cardiac patients, Food frequency, lipid profile, HDL

INTRODUCTION

India is encountering a rapid health transition, with an increasing burden of chronic diseases. The plague of infectious diseases has been overtaken by non-communicable diseases (NCD). Modifiable risk factors such as dyslipidemia including high levels of Low density lipoprotein cholesterol (LDL-C), low levels of high density lipoprotein cholesterol (HDL-C) and high levels of fasting triglycerides (TG), high blood pressure, tobacco use, abdominal obesity and physical inactivity, diet with low consumption of fruits and vegetables, psychosocial stress play a major role in Cardiovascular diseases. [1] Other elements such as apolipoprotein B (ApoB) and apolipoprotein C- III (ApoC-III) content in very low density lipoprotein cholesterol may be crucial in assessing CVD risk. [2]

Abnormal lipid profile results in damage to the endothelial cells which through a series of events results in a deadly blood clot. [3] Diet has a significant impact on lipid profile; weight loss induced by restricted caloric intake with or without physical activity decreases the plasma TG levels and increase HDL thereby reducing cardiovascular risk. [4] Manipulating dietary macronutrient content can improve the lipid profile. Many reports have shown a beneficial effect of low fat diets on lipid profile. Research suggests that certain lipoproteins that become part of cholesterol-carrying lipoproteins are important markers for CVD risk. [3] There are a number of studies which show that diet has influence

on lipid profile of CVD patients but there are very few studies on the influence of frequency of consumption of different food items, meal pattern on the lipid profile of CVD patients, hence, there was a research gap.

Aim and objectives

a) To study the dietary habits of young cardiac patients.
b) To study the influence of different foods on the lipid profile of the subjects.

MATERIALS AND METHODS

The cardiovascular disease patients from Sri Jayadeva Institute of Cardiovascular Sciences and Research, Bengaluru were selected for the study by purposive sampling. The sample size was 100. Patients belonging to the age group 22-45 who were admitted to the general ward of the hospital from March to April 2016 were selected. The general information of the subjects was collected using interviewer administered structured questionnaire. The socio economic status of the subjects was classified based on education, monthly family income, and occupation according to Kuppuswamy scale. Patient informed written consent was taken in the local language.

A questionnaire was prepared for collecting information regarding the type of diet, number of meals consumed, frequency of meals consumed outside home, snacking pattern, smoking and alcohol consumption, regular fruit consumption, late dinner etc.

A food frequency questionnaire was selected for collecting the data on frequency of consumption of different foods. The list contained 85 foods selected from the following food groups cereals and millets , pulses, green leafy vegetables, meat, fish and poultry other vegetables, dairy products, fruits, beverages, fats and oils, sugars, fried foods, instant foods, fast foods, bakery items. A food frequency questionnaire [5] was modified by including the local foods. The frequency of consumption was assessed for a month and the frequency of consumption of food was expressed in terms of more than 3 times per day, two times per day, one time per day, 5-6 times per week, 3-4 times per week, 1-2 times per week, 1-3 per month, rarely. Portion size was taken as one standard serving. The relation between each of these frequencies and their respective lipid profile was analysed.

Assessment of lipid profile

Blood sample was collected from each subject by vein puncture and taken into EDTA/non EDTA vials for assaying hematological parameters such as lipid profile. The hematological analysis was done at baseline prior to the treatment. Total cholesterol levels were estimated by the CHOD-PAP (cholesterol oxidase – phenol + aminophenazone) enzymatic method, triglycerides by the GPO-PAP (glycerol-3-phosphate oxidase – phenol + aminophenazone) method and HDL cholesterol by precipitation with phosphotungstic acid. VLDL cholesterol was estimated by the Friedewald equation (VLDL = triglycerides/5) and LDL cholesterol by the equation LDL = total cholesterol – (HDL + VLDL).

Statistical analysis

Descriptive and inferential statistical analysis was done. Results on continuous measurements have been presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in number (%). One way Analysis of variance (ANOVA) was used to assess the relation between categorical and continuous variables such as food frequency items with lipid profile. The difference between each group was obtained using Tukey's Post hoc test for data which had met the homogeneity of variance. The level of significance was obtained at 5 per cent. The statistical software namely SPSS 20, was used for the analysis of the data. Microsoft Excel 2010 was used to generate graphs.

RESULT

General information

The general information of the subjects is presented in Table no.1

In the present study, the majority of the subjects were in the age range of 31-40 years with the mean age of 37.1 years. 87 per cent of the subjects were males, majority of the subjects were illiterates, a higher proportion (86%) belonged to upper lower socioeconomic status with, income less than Rs.11,500/month. The findings of the study showed that majority of the subjects (53%) were non-smokers and around seven per cent had quit smoking. Alcohol was consumed regularly by 21 per cent daily, whereas 65 per cent of the subjects never consumed alcohol.

Table 1: General profile of the subjects

Parameters		**No. of subjects**
Age (years)		
22-30		24
31-40		44
41-45		32
Gender		
Male		87
Female		13
Educational level		
Illiterate		56
Primary		6
Middle		10
Matriculated		24
Secondary		0
Graduate		4
Post-graduate		0
Socioeconomic status		
Upper	I) upper	0
middle	II) upper middle	1
	III) lower middle	7
Lower	IV)upper lower	86
	V) lower	6

Food habits of the subjects

Eighty nine per cent of the subjects were non vegetarians (Figure 1)

Eighty per cent of the subjects consumed three meals per day. Thirty six per cent of the subjects skipped meals, of which fifty three per cent skipped breakfast. Forty eight per cent of the subjects never consumed food outside home where as 27 per cent ate food outside home daily.

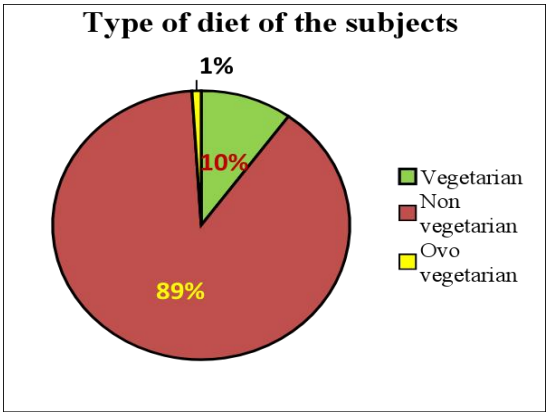

Figure 1: Type of diet of the subjects

Frequency of consumption of different food items among the subjects

It was observed that foods that were consumed daily were rice (94%), wheat (61%) and ragi (55%). dhals (66%), fresh milk (30%), curds (37%), buttermilk (36%), tea (86%), green leafy vegetables (67%), chicken (70%) eggs (59%) were consumed at least 1-2 times per week. The study also revealed that some foods were never consumed by the subjects such as fish (86%), cheese (98%), carbonated beverages (75%), ready to eat foods (97%).

LIPID PROFILE OF THE SUBJECTS

The lipid profile of the subjects with cardiovascular disease is based on the guidelines given by Adult Treatment Panel III (ATP III) of National Cholesterol Education Program (NCEP). [6] (Table 2)

Among the subjects studied, 14 per cent of the subjects have high total cholesterol, 10 percent had borderline high cholesterol. The American Heart Association recommends cholesterol ratios to fall below 5:1, almost 73% of the subjects had a HDL/Total cholesterol Ratio below 5:1 and only 27% had the ratio above 5:1.

Borderline high LDL to Very high LDL levels occurred in ten per cent to six per cent respectively of all the subjects.

Serum triglycerides levels were normal among 60 per cent of the subjects and 19 per cent of the subjects had high triglycerides levels.

Influence of frequency of food consumption on lipid profile

The influence of frequency of consumption of different foods on lipid profile of the subjects revealed the following results.

None of the foods except rice showed a statistically significant difference (at 0.05 level) on total cholesterol, LDL cholesterol, serum triglycerides, very low density lipoprotein and non-HDL. The only food that had statistically significant influence on lipid profile was rice.

Table 2: Lipid profile of the subjects

Lipid parameters	Reference range	Percentage (N=100)	Mean	Standard deviation
Total cholesterol	<200 desirable	76	149	±34.79
	200-239 mgs/dl (borderline high)	10	218.9	±10.99
	>239 (high)	14	279	±47.34
HDL Cholesterol	<40	68	39.20	±6.47
	>59	32	67.20	±5.62
LDL Cholesterol	<100 mgs/dl	48	72	±17.67
	100-129(above optimal)	23	113.73	±8.2
	130-159 (borderline high)	10	135.80	±7.88
	160-189(high)	0		
	>189(very high)	6	236.16	±65.77
Serum triglycerides	<150mgs/dl normal	60	103.1	±23.03
	150-199 (borderline)	20	175.75	±11.74
	200-499(high)	19	272.73	±75.49
	>499(very high)	1	519	-
Non HDL	<130 mgs/dl	43	89.9	±50.28
	>130mgs/dl	57	172.29	±21.66
VLDL	<30	60	20.65	±4.65
	>30	40	46.0	±17.09
Total cholesterol/HDL. Ratio	Below 5:1	73	4.04	±0.91
	Above 5:1	27	8.40	±5.0

Table 3: Frequency of rice consumption and its influence on HDL cholesterol

Rice consumption				
Tukeys post hoc test	**≥3 times a day (1)**	**1 time per day (2)**	**Mean difference = (1)-(2)**	**P value**
Total cholesterol	**172**	**168**	**4.90**	**0.997**
HDL mg/dl	40.04	32.46	7.58*	0.031
LDL	102.16	101.65	0.50	1.000
Serum triglycerides	155.52	149.07	6.44	0.988

***Significant at 5 per cent level**

Analysis of variance showed a statistically significant difference (<0.05) in the HDL cholesterol level and frequency of consumption of rice. As the frequency of consumption of rice increased the HDL cholesterol level increased. The significant difference was found between the groups who consumed rice more than 3 times a day than among subjects who consumed only once a day or 1 times day (Table 3).

DISCUSSION

Food habits

Breakfast is one of the main meals of the day. Among the subjects in the present study 53 per cent skipped breakfast. It was the highly skipped meals compared to the other meals of the day. Skipping breakfast has been associated with higher incidence of myocardial infarction that is 27 per cent higher than in those individuals who did not skip breakfast. [7] In a cross sectional study on the breakfast habits in patients hospitalized for acute coronary syndrome. 44 per cent of the subjects skipped their breakfast and more than half of them had poor breakfast habits. [8]

In this study the subjects did not consume fruits and vegetables on a regular basis which have protective effects on the heart. Not only a single factor but a combination of food factors is responsible for CVD such as bakery and desserts which are high in sugars, mutton and beef which are high in saturated fats are restricted for the subjects suffering from CVD's. Majority

of the subjects were non vegetarians. Though the consumption of mutton and beef is to be restricted, the consumption of mutton was high among the subjects and majority of the subjects were not consuming fish. Tran's fatty acid sources such as butter and margarine were not consumed regularly by the subjects. According to Fung *et al*, diet pattern with increased red meat, processed meat, high fat dairy products, refined grains, sweets (western pattern of consumption) a positive correlation was found between the western pattern and the biomarkers suggesting that the effect of diet on CVD risk may be mediated through these biomarkers. [9] Another study suggested a strong positive association between increased red meat consumption and cardiac disease risk. [10]

Among the subjects in the current study majority of the subjects consumed refined rice at least thrice daily and consumption of whole grains and millets which are good sources of fiber were not consumed by many. According to the Indian Heart Association, among South Asians the consumption of processed carbohydrates such as refined rice, bread products such as naan or puri are major contributors to elevated triglycerides which increases the risk of CVD's. [11]

Influence of food frequency on lipid profile.

In the present study the HDL cholesterol was low in the subjects who consumed rice only once a day while the subjects who consumed rice more frequently had high HDL cholesterol. In contrast, increased consumption of refined grains is associated with lower high- density lipoprotein cholesterol. In men, researchers found that higher percentage of calories from total carbohydrates had lower HDL levels. [12]

CONCLUSION

Ninety per cent of the subjects were non vegetarians. Protective foods such as fruits and vegetables and fish were consumed inadequately by the subjects. Lipid profile of the subjects was not adversely influenced by the frequency of consumption of different foods. A positive relation between the consumption of rice and HDL cholesterol level was found among the subjects. Frequency of rice consumption increased HDL cholesterol which is considered to be good cholesterol. Other parameters of lipid profile such as total cholesterol, low density lipoprotein, VLDL, non-HDL were not influenced by frequency of consumption of rice. Other foods studied did not have any significant influence on lipid profile.

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