CORRELATION OF FOOD INTAKE WITH LIPID PROFILE IN PRIVATE AND PUBLIC HOSPITAL CARDIAC PATIENTS

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ABSTRACT

Introduction:

Heart is one of your body's most important organs. The general term used to cover malfunctions of the heart is Heart Disease, or sometimes Cardiac Disease. Though there are multiple forms of heart disease, our discussion focuses on the two most common: Heart Attack and Heart Failure (American Heart Association, 2014).

Objectives:

To find association of food intake with lipid profile between in cardiac patients attending public and private hospital.

Methods:

A cross-sectional study was conducted in 150 cardiac patients (98 males) attending private and public hospital in Mumbai city. Anthropometry was measured. Food intake was assessed using a food frequency questionnaire. Serum lipid profile was measured. Analyses was performed using SPSS software for Windows (version 16.0, 2007, SPSS Inc, Chicago, IL).Independent sample T test was used to analyse the data.Pearson's correlation was used to assess correlation between dietary intake and blood parameters. P-value < 0.05 was considered to be statistically significant.

Results:

The mean HDL cholesterol was 33±5 mg/dl, LDL cholesterol was 143±38 mg/dl. VLDL cholesterol was 103±39 mg/dl, total cholesterol was 256±55 mg/dl, triglyceride was 104±33 mg/dl, fasting blood glucose was 120±25 mg/dl and post-prandial blood sugar was 206±25 mg/dl. Total cholesterol was significantly higher in private hospital patients as compared to public hospital patients (p<0.05). HDL cholesterol was significantly correlated with green leady vegetable, fruits and nuts and oil seeds intake (p<0.05). LDL cholesterol was significantly correlated with pulses, ice-cream, carbonated drinks and jams and jellies intake (p<0.05). Total cholesterol was correlated with flavored yoghurt, pork, fruit juices and ghee intake (p<0.05). HDL cholesterol was significantly correlated with cheese, organ meat, protein shake and nuts and oilseeds intake (p<0.05). LDL cholesterol was significantly correlated with milk, cheese, fruit juices, deep fried snacks and carbonated soft drinks intake (p<0.05). Total cholesterol intake was significantly correlated with bread, cheese, paneer, chicken, fish, beef, eggs, vegetables and deep fried snacks intake (p<0.05).

Conclusion:

There is a significant association of food intake with lipid profile with food intake in both private and public hospitals. Food counseling is essential to improve lipid profile of cardiac patients.

Key words:

HDL, LDL, Total cholesterol, Lipid profile, Heart failure, PUFA, MUFA.

Introduction:

Heart is one of your body's most important organs. The general term used to cover malfunctions of the heart is Heart Disease, or sometimes Cardiac Disease. Though there are multiple forms of heart disease, our discussion focuses on the two most common: Heart Attack and Heart Failure (American Heart Association, 2014).A fat diet rich in saturated SFA and low in PUFA is said to be an important cause of atherosclerosis and CVD. It was stated that dietary SFA have harmful effects and dietary PUFA have protective effects on atherosclerosis and CVD. (Renaud S et al, 2005)Replacement of saturated fatty acids by PUFA and MUFA has shown to lower the levels of both LDL and HDL cholesterol (Guo K et al, 2010).There's a evidence that SFA's in the context of dairy foods, particularly fermented dairy products, have neutral or inverse association with CVD (Hippisley-CoxJ et al, 2010). A greater proportion of regular patients wanted more extensive explanations from their physicians regarding their treatment. And it was seen that Private patients belonged to higher socio-economic classes than regular patients (Carmel S et al, 2009).It is seen that patients given private service were older and had significantly more co morbidities, especially cardiac history. A significantly higher proportion of patients given public service suffered confirmed myocardial infarction, and were hospitalized in the intensive coronary care unit (Barbash IM et al, 2003).There is growing evidence that SFAs in the context of dairy foods, particularly fermented dairy products, have neutral or inverse associations with CVD(Krauss RM et al, 2015).Replacement of SFA's with PUFA has been associated with reduced CVD risk although there is heterogeneity in both fatty acid categories (British Cardiac Society BHS et al, 2005)

Methodology:

The study was designed in such a manner that patients were taken from private and government hospital to understand the differences in educational status, socio economic group, literacy, Lifestyle habits, physical activity, eating disorders.etc.Analyses were performed using SPSS software for Windows (version 16.0, 2007, SPSS Inc, Chicago, IL). Data are presented as Mean ± SD or percentage (frequency).Independent Sample T Test was used to analyse difference in lipid profile according to 2 hospitals.Kendall Tau's bcorrelations was used to assess correlation between dietary intake and blood parameters. P-value < 0.05 was considered to be statistically significant.

Results: Results on 150 cardiac patients (98 males) aged 53±11 years are presented in the current study.

Table 1: Frequency consumption of various foods:

Foods Groups	Private					Public				
	Daily	Weekly	Fortnight	Monthly	Never	Daily	Weekly	Fortnight	Monthly	Never
Rice	75 (100)	-	-	-	-	74 (100)	-	-	-	-
Other cereals	75 (100)	-	-	-	-	71 (95.9)	3 (4.1)	-	-	-
Pulses	59 (78.7)	16 (21.3)	-	-	-	61 (82.4)	13 (17.6)	-	-	-
Soybean	-	26 (34.7)	12 (16)	14 (18.7)	23 (30.7)	-	16 (21.6)	6 (8.1)	22 (29.7)	30 (40.5)
Bread	-	49 (65.3)	4 (5.3)	13 (17.3)	9 (12)	6 (8.1)	37 (50)	6 (8.1)	15 (20.3)	10 (13.5)
Biscuit	26 (34.7)	35 (46.7)	4 (5.3)	-	10 (13.3)	21 (28.4)	27 (36.5)	7 (9.5)	3 (4.1)	16 (21.6)
Curd	17 (22.7)	39 (52)	5 (6.7)	5 (6.7)	9 (12)	11 (14.9)	35 (47.3)	7 (9.5)	8 (10.8)	13 (17.6)
Flavored yoghurt	-	-	-	6 (8)	69 (92)	-	-	-	6 (8.1)	68 (91.9)

Item										
Ice-cream	-	8 (10.7)	1 (1.3)	57 (76)	-	-	13 (17.6)	3 (4.1)	50 (67.6)	8 (10.8)
Milk	65 (86.7)	-	10 (13.3)	-	-	60 (81.1)	-	7 (9.5)	1 (1.4)	6 (8.1)
Cheese	-	9 (12)	4 (5.3)	57 (76)	5 (6.7)	3 (4.1)	6 (8.1)	1 (1.4)	47 (63.5)	17 (23)
Paneer	-	66 (88)	-	9 (12)	-	-	50 (67.6)	-	14 (18.9)	10 (13.5)
Chicken	18 (24)	9 (12)	-	-	48 (64)	13 (17.6)	14 (18.9)	2 (2.7)	10 (13.5)	35 (47.3)
Fish	-	23 (30.7)	-	14 (18.7)	38 (50.7)	-	27 (36.5)	2 (2.7)	13 (17.6)	32 (43.2)
Mutton	9 (12)	14 (18.7)	1 (1.3)	4 (5.3)	47 (62.7)	6 (8.1)	15 (20.3)	2 (2.7)	7 (9.5)	44 (59.5)
Beef	9 (12)	14 (18.7)	-	4 (5.3)	48 (64)	7 (9.5)	11 (14.9)	2 (2.7)	6 (8.1)	48 (64.9)
Organ meat	-	5 (6.7)	9 (12)	13 (17.3)	48 (64)	-	8 (10.8)	6 (8.1)	10 (13.5)	50 (67.6)
Eggs	19 (25.3)	9 (12)	9 (12)	-	38 (50.7)	15 (20.3)	16 (21.6)	9 (12.2)	-	34 (45.9)
Pork	-	6 (8)	-	-	69 (92)	2 (2.7)	4 (5.4)	-	-	68 (91.9)
Green leafy vegetables	39 (52)	27 (36)	9 (12)	-	-	33 (44.6)	27 (36.5)	14 (18.9)	-	-
Other vegetables	56 (74.7)	18 (24)	-	-	1 (1.3)	51 (68.9)	18 (24.3)	3 (4.1)	-	2 (2.7)
Roots and tubers	61 (81.3)	13 (17.3)	-	-	1 (1.3)	58 (78.4)	8 (10.8)	4 (5.4)	-	4 (5.4)
Fruits	56 (74.7)	13 (17.3)	5 (6.7)	-	1 (1.3)	47 (63.5)	14 (20.3)	5 (6.8)	-	7 (9.5)
Fruit juices	-	4 (5.3)	-	61 (81.3)	10 (13.3)	-	4 (5.4)	6 (8.1)	45 (60.8)	19 (25.7)
Milk shake	-	8 (10.7)	4 (5.3)	21 (28)	42 (56)	-	5 (6.8)	1 (1.4)	20 (27)	48 (64.9)
Yakult	-	-	-	13 (17.3)	62 (82.7)	-	-	3 (4.1)	6 (8.1)	65 (87.8)
Protein shake	-	-	-	-	75 (100)	3 (4.1)	-	-	-	71 (95.9)
Nuts and oilseeds	17 (22.7)	18 (24)	-	31 (41.3)	9 (12)	16 (21.6)	21 (28.4)	-	20 (27)	17 (23)
Butter	5 (6.7)	34 (45.3)	-	8 (10.7)	28 (37.3)	5 (6.8)	25 (33.8)	-	7 (9.5)	27 (50)
Ghee	21 (28)	23 (30.7)	-	31 (41.3)	-	15 (20.3)	24 (32.4)	-	29 (39.2)	6 (8.1)
Oil	75 (100)	-	-	-	-	74 (100)	-	-	-	-
Deep fried snacks	5 (6.7)	54 (72)	-	8 (10.7)	8 (10.7)	2 (2.7)	49 (66.2)	5 (6.8)	10 (13.5)	8 (10.8)
Savory snacks	-	17 (22.7)	8 (10.7)	8 (10.7)	42 (56)	-	12 (16.2)	8 (10.8)	6 (8.1)	48 (64.9)
Diet snacks	-	-	4 (5.3)	12 (16)	59 (78.7)	-	2 (2.7)	1 (1.4)	12 (16.2)	59 (79.7)
Pickle/ sauces	12 (16)	26 (34.7)	9 (12)	10 (13.3)	18 (24)	9 (12.2)	25 (33.8)	14 (18.9)	11 (14.9)	15 (20.3)
Carbonated soft drinks	8 (10.7)	-	-	44 (58.7)	23 (30.7)	5 (6.8)	-	-	43 (58.1)	26 (35.1)
Jams/ Jellies	-	5 (6.7)	-	12 (16)	58 (77.3)	-	5 (6.8)	-	11 (14.9)	58 (78.4)
Noodle/ pasta	-	49 (65.3)	-	8 (10.7)	18 (24)	-	35 (47.3)	3 (4.1)	7 (9.5)	29 (39.2)

Table 1 presents the frequency of food consumption of private and public hospital patients. As seen in **Table 1**, rice, cereals pulses, milk and oil was consumed by most patients from private and public hospitals. Non-vegetarian foods, yakult, diet-snacks and jams/ jellies were consumed by very small percentage of people from both the groups (**Table 1**).

Table 2: Lipid profile according to hospital type

Lipid profile	Private hospital	Public hospital
HDL cholesterol (mg/dl)	34±5	33±5
LDL cholesterol (mg/dl)	142±39	146±38
VLDL cholesterol (mg/dl)	101±35	105±44
Total cholesterol (mg/dl)	266±47	244±60*
Tri-glycerides (mg/dl)	103±28	104±37

Data presented as Mean±SD. *$p<0.05$ for comparison between private and public hospital

The mean HDL cholesterol was 33±5 mg/dl, LDL cholesterol was 143±38 mg/dl. VLDL cholesterol was 103±39 mg/dl, total cholesterol was 256±55 mg/dl, triglyceride was 104±33 mg/dl, fasting blood glucose was 120±25 mg/dl and post-prandial blood sugar was 206±25 mg/dl. **Table 2** gives comparison of lipid profile according to type of hospital. Total cholesterol was significantly higher in private hospital patients as compared to public hospital patients ($p<0.05$) (**Table 2**). There was no significant difference in other lipid profile parameters of 2 hospitals ($p<0.05$) (**Table 2**).

Table 3: Correlation of food intake with lipid profile in private hospital patients

Food groups	HDL	LDL	VLDL	TC	TG
Pulses	0.152	-0.205*	0.030	-0.028	0.013
Bread	-0.042	0.097	0.035	0.106	-0.283*
Flavoured Yoghurt	-0.112	-0.098	0.062	-0.216*	0.107
Ice Cream	0.150	-0.242*	-0.204*	-0.022	-0.067
Cheese	-0.098	0.164	-0.195*	0.394*	0.004
Pork	-0.112	-0.098	0.062	-0.216*	0.107
Green leafy vegetables	0.234*	0.027	0.175	-0.284*	0.024
Roots and Tubers	0.126	-0.104	-0.163	0.160	-0.327*
Fruits	0.203*	0.121	-0.044	0.094	-0.048
Fruit Juices	0.067	-0.060	-0.185	0.269*	-0.171
Nuts and Oilseeds	0.289*	-0.161	0.086	-0.249*	0.083
Butter	0.141	-0.196*	-0.125	0.043	0.051
Ghee	0.055	0.123	-0.02	0.238*	0.116
Savoury Snacks	0.170	-0.183	0.026	0.022	-0.077
CarbonatedSoftDrinks	0.129	-0.321*	-0.177	0.043	-0.031
Jams/ Jellies	-0.018	-0.240*	-0.039	-0.177	0.171

Data presented as Kendall Tau's b value. *$p<0.05$

Table 3 presents correlation of lipid profile with food intake in private hospitals. As seen in **Table 3**, HDL cholesterol was significantly correlated with green leafy vegetable, fruits and nuts and oil seeds intake ($p<0.05$). LDL cholesterol was significantly correlated with pulses, ice-cream, carbonated drinks and jams and jellies intake ($p<0.05$) (**Table 3**). VLDL cholesterol was significantly correlated with ice-cream and cheese intake ($p<0.05$) (**Table 3**). Total cholesterol was correlated with flavored yoghurt, pork, fruit

juices and ghee intake (p<0.05) (**Table 3**). Triglyceride levels were correlated with bread, and roots and tubers intake (p<0.05) (**Table 3**). Lipid profile was not correlated with intake of other foods (p>0.05) (data not shown).

Table 4: Correlation of food intake with lipid profile in public hospital patients

Food groups	HDL	LDL	VLDL	TC	TG
Bread	-0.042	0.175	0.124	0.370*	-0.195
Curd	0.139	0.068	0.213*	0.045	-0.008
Milk	-0.121	-0.333*	0.253*	0.175	-0.153
Cheese	0.226*	0.311*	0.041	0.211*	0.010
Paneer	-0.038	0.091	0.117	0.219*	-0.364*
Chicken	0.028	-0.077	-0.149	0.210*	-0.051
Fish	-0.029	-0.061	-0.097	0.212*	-0.022
Mutton	-0.044	0.026	-0.102	0.164	-0.145
Beef	0.021	0.061	0.019	0.401*	-0.342*
Organ Meat	-0.214*	-0.148	-0.230*	0.170	-0.102
Eggs	0.025	0.145	0.055	0.287*	-0.132
Other Vegetables	-0.019	0.0480	-0.030	-0.220*	-0.167
Roots and Tubers	-0.042	-0.108	-0.112	0.051	-0.253*
Fruits	0.115	0.185	0.209*	0.197	0.062
Fruit Juices	0.096	-0.398*	-0.516*	-0.038	0.370*
Yakult	0.054	0.099	0.059	0.01	0.299*
Protein Shakes	-0.305*	0.086	0.320*	-0.114	-0.342*
Nuts &Oilseeds	0.210*	-0.040	0.024	-0.141	0.062
Deep fried snacks	-0.055	0.280*	0.244*	0.247*	-0.154
Diet Snacks	-0.022	0.052	0.234*	0.040	-0.221
Carbonated Soft Drinks	0.182	-0.234*	-0.184	0.168	0.084
Jams /Jellies	0.092	-0.116	-0.056	-0.110	0.409*
Noodles/ Pasta	0.268*	-0.180	-0.045	0.031	0.115

Data presented as Kendall Tau's b value. *p<0.05

Table 4 presents correlation of lipid profile with food intake in public hospitals. As seen in **Table 4**, HDL cholesterol was significantly correlated with cheese, organ meat, protein shake and nuts and oilseeds intake (p<0.05) (**Table 4**). LDL cholesterol was significantly correlated with milk, cheese, fruit juices, deep fried snacks and carbonated soft drinks intake (p<0.05) (**Table 4**). VLDL cholesterol was significantly correlated with curd, milk, organ meat, fruit juices, protein shake, deep fried snacks and diet snacks intake (p<0.05) (**Table 4**). Total cholesterol intake was significantly correlated with bread, cheese, paneer, chicken, fish, beef, eggs, vegetables and deep fried snacks intake (p<0.05) (**Table 4**). Triglycerides were significantly correlated with paneer, beef, roots and tubers, fruit juices, yakult, protein shake and jams/jellies intake (p<0.05) (**Table 4**).Lipid profile was not correlated with intake of other foods (p>0.05) (data not shown)

Discussion:

Table 1 presents the frequency of food consumption of private and public hospital patients.A study stated that patients from public hospitals consume more of high protein and high fat diet as compared to patients of private hospitals (Pons JM et al, 2008).

Table 2 gives comparison of lipid profile according to type of hospital. Total cholesterol was significantly higher in private hospital patients as compared to public hospital patients (p<0.05) (**Table 2**).In this study it was stated that the frequent consumption of nuts may protect against risk of CHD event. The favourable fatty acid profile of many nuts is one possible explanation for such an effect (Sjöström-Strand A et al, 2013).

As seen in **Table 3**, HDL cholesterol levels of private hospitals was significantly correlated with green leafy vegetable, fruits and nuts and oil seeds intake (p<0.05). LDL cholesterol was significantly correlated with pulses, ice-cream, carbonated drinks and jams and jellies intake (p<0.05) (**Table 3**).A study stated that there is a significant correlation between consumption of type of food and fats being consumed by cardiac patients. A high fat and high protein diet specially SFA's acts as a key contributor in developing CVD (Jin R et al, 2005).

  As seen in **Table 4**, HDL cholesterol levels of public hospitals was significantly correlated with cheese, organ meat, protein shake and nuts and oilseeds intake (p<0.05) (**Table 4**). LDL cholesterol was significantly correlated with milk, cheese, fruit juices, deep fried snacks and carbonated soft drinks intake (p<0.05) (**Table 4**). VLDL cholesterol was significantly correlated with curd, milk, organ meat, fruit juices, protein shake, deep fried snacks and diet snacks intake (p<0.05) (**Table 4**).In a study it was shown that raising the CHO content of the diet increases serum triacylglycerol concentrations. As compared with starches, sugars tend to increase serum triacylglycerol concentrations by 60%.hence it was stated that the content of CHO and sugars through diet should be monitored for prevention of CHD (Rubinshtein R et al, 2010).

Conclusion:

There is a significant association of food intake with lipid profile in both private and public hospitals. Food and Nutrition counseling is essential to improve lipid profile of cardiac patients.

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