

Lifestyle Pattern and Food and Nutrient Intake among Hyperlipidemics

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Abstract

Hyperlipidemia is one of the main risk factor associated with the high prevalence of cardiovascular complications. Present study was conducted to find out the lifestyle pattern and food and nutrient intake among hyperlipidemics. On the basis of lipid profiles, 30 hyperlipidemic subjects (men and women) of 40 to 60 years of age were selected from Parbhani city of Maharashtra State. The information was collected on family history, awareness and exercise pattern of hyperlipidemics. Food intake and nutrient intake was studied and nutrient adequacy was calculated. Results indicated that 66 per cent of the hyperlipidemic subjects had family history of hyperlipidaemia and it was mostly inherited from mother. Maximum (23) number of subject experienced blood pressure fluctuation followed by breathlessness (21) and dizziness (20). More than 50 per cent subjects knowing the meaning and causes of hyperlipidemia. Majority (86.66 %) of the subjects performed daily walking as an exercise pattern followed by yoga and sports. Intake of pulses, green leafy vegetables, milk and milk products, fruits and sugar and jaggary was found to be more by the hyperlipidemic women than those by hyperlipidemic men. The diet of selected hyperlipidemic subjects was adequate in providing maximum nutrients in needed amounts as per the recommended dietary allowances for adults specially the adequacy of fat intake by men (201 %) and women (276 %) was highest among the nutrients. In conclusion, it can be said that modifications in the lifestyle and dietary pattern of hyperlipidemics needs to be followed to lead a healthier life.

Keywords: Hyperlipidemia; Food and Nutrient Intake; Awareness; Exercise Pattern.

Introduction

Health of all is an enduring vision that recognizes the oneness of humanity and therefore there is a need to promote health universally. According to World Health Organization, today's emphasis is on health expectancy rather than life expectancy. In Asian countries, due to globalization, urbanization and increasing life span there is a great change in life style of people during the past four decades. This change has led to a change in disease pattern as infectious diseases have gradually diminished and

diet related lifestyle diseases such as obesity, diabetes, hypertension, cardiovascular diseases and some types of cancer have become emerging health problems in India (Musaiger, 2003).

Hyperlipidemia is one of the main risk factor associated with the high prevalence of cardiovascular complications. Globally, a third of ischaemic heart disease is attributable to high cholesterol. Raised total cholesterol is a major cause of disease burden in both the developed and developing world as a risk factor for Ischemic heart disease and stroke. Overall, it is estimated to cause 2.6 million deaths (4.5 % of total) and 29.7 million disability adjusted life years (WHO, 2016). The results of a study carried out in Tamil Nadu, Maharashtra and Jharkhand by Joshi *et al.*, (2014) have disclosed that around 13.9 per cent population had hypercholesterolemia, 29.5 per cent had hypertriglyceridemia, 72.3 per cent had low HDL-C, 11.8 per cent had high LDL-C levels and 79 per cent had abnormalities in one of the lipid parameters. Obesity, diabetes and dysglycemia were the common significant risk factors for dyslipidemia. Asmare

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Received on 16.01.2017, Accepted on 23.01.2017

(2014) revealed that there are significant differences in blood lipid levels and the prevalence of hyperlipidemia between ethnic groups, different dietary habits, life style and level of physical activity, as well as genetic background. Also exogenous factors, such as dietary intake (fat, cholesterol), alcohol, use of contraceptives and other pharmacologic agents are indicated as the main secondary causes and risk factors of hyperlipidemia in adults. This indicates that there are many inter-related causes and risk factors which lead to development of hyperlipidemia and other chronic illnesses of metabolic syndrome. Keeping this in view the study was carried out with the following objectives.

1. To study the lifestyle pattern among hyperlipidemics.
2. To study the food and nutrient intake by the hyperlipidemics.

Methods

Selection of Hyperlipidemic Subjects

A total number of 50 subjects of 40 to 60 years of age were selected randomly based on their past medical history and blood cholesterol level, residing in Parbhani city of Maharashtra State. All the selected subjects were screened for their lipid profile in the 'Pranav pathology laboratory' with the help of pathologist. On the basis of lipid profiles, 30 hyperlipidemic subjects were selected for the present study. Thirty hyperlipidemic subjects comprised of men (12) and women (18). The study was approved by institutional ethics committee and an informed written consent in local language was taken from all the subjects prior to their recruitment in the study.

Collection of General Information of the Selected Subjects

All the hyperlipidemic (30) subjects were personally interviewed by the investigator with the help of pretested questionnaire so as to elicit the information on their socio-economic background, age, sex, history of diseases, exercise pattern and awareness about hyperlipidemia and health problems.

Determination of Intake of Food and Nutrient by the Selected Subjects

Food intake of the selected hyperlipidemic subjects per day was collected by 24 hour recall method. The type of food preparation and amount of each food

preparation consumed by all the selected subjects and the raw ingredients used for each preparation was recorded. Quantities of food consumed were converted into raw equivalents of food items to determine the food intake per day. The intake of different nutrients per day by the selected hyperlipidemic subjects was then calculated from the food nutrient values using nutritive value of Indian Foods. (Gopalan *et al.*, 2004). Per cent adequacy of different nutrients in the diet of the selected hyperlipidemic subjects was calculated based on the recommended dietary allowances.

In order to draw valid conclusions from the present study, the collected data were consolidated, computed and exposed for statistical analysis using Indian NARS (National Agricultural Research System) statistical computing portal (<http://www.iasri.res.in/sscnars/>).

Results and Discussion

Socio-economic status of the selected hyperlipidemic subjects is given in Table 1. Out of 30 selected hyperlipidemic subjects, equal number of subjects were from 40-50 and > 50-60 years of age group. Majority (18) of the subjects were female and the remaining (12) were male. Maximum (66.66) per cent of subjects were belonging to nuclear family and the remaining 33.33 per cent were from joint family. Out of 30 hyperlipidemic subjects, more per cent of subjects were graduate (26.66) and post graduate (26.66), whereas seven subjects had school education and five completed higher secondary education. Only two subjects were not educated.

A relatively high (66.66) per cent of subjects were belonging to income group of Rs. >25,000 to \geq 50,000. Thirty per cent of the selected subjects had a monthly family income of Rs. \geq 10000 to 25,000 and the remaining 3.33 per cent of the subjects were from families of monthly income of Rs. < 10,000. Maximum per cent of the selected hyperlipidemic subjects were engage in doing service (43.33) followed by home maker (36.66) as an occupation. Even six subjects were found to be businessmen.

On the whole, results indicated that the subjects were belonging to 40 to 60 years of age. Majority of the selected subjects were female, graduate, from nuclear families and belonging to families of monthly family income of Rs. >25,000 to 50,000. Service was the main occupation followed by home maker among the selected hyperlipidemic subjects.

In random selection for hyperlipidemic subjects it

was noticed that more number of females were suffering from hyperlipidemia. The selected female subjects were of >40 years of age which is a menopausal stage. Similar observations were also recorded by Sartika *et al.*, (2015). This is probably due to the influence of the hormone estrogen prior to menopause (Martins, 2001). Estrogen can reduce the lipase activity of the heart so that HDL cholesterol remains high, and can increase LDL receptor activity, thus lowering LDL cholesterol and total cholesterol (O'Meara, 2004). When a woman regularly menstruates, it will be protected by the hormone estrogen, being less likely to develop dyslipidemia until reaching menopause. Reduced estrogen levels during menopause can cause elevated levels of cholesterol (Martins, 2001).

Out of 30 selected hyperlipidaemic subjects, it was found that a relatively high (66) per cent of subjects had a family history of hyperlipidaemia. Out of these, 36.66 per cent subjects reported that it was inherited from mother whereas 30 per cent inherited from father. It was reported that 17 and 13 subjects had a family history of blood pressure and acidity respectively. Even three subjects had a family history of heart disease (Table 2).

On the whole, results indicated that majority of the hyperlipidemic subjects had family history of hyperlipidaemia and it was inherited from mother. Nwamarah *et al.*, (2016) also reported that a greater percentage of respondents had a strong family history of hyperlipidemia which was inherited from father (37.5). On the contrary, in the present study, majority of the respondents inherited hyperlipidemia from maternal side (36.66 %).

Hyperlipidemia is associated with genetic disorders. Most hereditary lipid disorders are common among generations of families with obesity problems. Some familial lipid disorders can directly result in over production of cholesterol by the body. Another condition called 'Familial Combined Hyperlipidemia (FCHL)' can lead to high cholesterol levels including high triglyceride levels. Another hereditary condition called 'Familial Defective Apolipoprotein B-100', can cause the LDL blood cholesterol (also called the 'bad' cholesterol) to increase and also raise total cholesterol levels. (Shoulders *et al.*, 2004). It was found that more than 55 per cent subjects had a history of blood pressure. Even Nwamarah *et al.*, (2016) found that 25 per cent of hyperlipidemic respondents had hypertension. Many studies have demonstrated that dyslipidemia, one of the strong predictors of cardiovascular disease, causes endothelial damage and loss of physiological vasomotor activity. (Nickenig, 2002; Nickenig and

Harrison, 2002 and Wong *et al.*, 2006). The damage may manifest as elevated systemic blood pressure (BP).

Information regarding health complications experienced by the selected hyperlipidemic subjects is given in Table 3. It was found that more than 65 per cent subjects had some or the other health complication. Maximum (23) number of subjects experienced blood pressure fluctuation followed by breathlessness (21) and dizziness (20). Only three hyperlipidaemic subjects had undergone through heart surgery and two suffered from brain stroke. Hypercholesterolemia can also influence blood pressure by potentiating the effects on the endothelium of the vasoconstrictors endothelin-1 and Angiotensin II. (Cardillo *et al.*, 2000 and Wierzbicki *et al.*, 2002). Salkic *et al.*, (2014) reported that dizziness and breathlessness were the complications found in hypertensive subjects. These results are in line with the results of the present study.

Awareness regarding hyperlipidemia among hyperlipidemic subjects is presented in Table 4. Majority (17) of the subjects were aware about the hyperlipidemia, even 12 subjects knew the causes of hyperlipidemia. Newspaper, television, magazine and physician were the various sources from which the subjects acquired the information about hyperlipidemia. It was found that all the selected hyperlipidemic subjects acquired the knowledge regarding hyperlipidemia from physician. Beside this more number of subjects acquired the information by reading newspaper (18), magazine (15) and television (11).

In nutshell, results inferred that more number of subjects knew the meaning of hyperlipidemia and causes of hyperlipidemia. Physician was the main source for acquiring the information about hyperlipidemia followed by reading newspaper and magazine among the selected subjects. Nwamarah *et al.*, (2016) conducted a study in Enugu State University Teaching Hospital (ESUTH) of Nigeria and found that about 45 per cent of the out-patients had a fair knowledge of hyperlipidemia whereas in the present study more per cent of the subjects were found to be aware about hyperlipidemia. It may be due to their consciousness about their condition which might have helped in improving the awareness.

It is clear from the data presented in Table 5 that a relatively very high per cent (86.66) of hyperlipidemic subjects followed walking daily as their exercise pattern. Sports activity as exercise was performed by 10 per cent of the selected subjects while only running was practiced by 6.66 per cent subjects and sports by

three subjects. One third of total subjects were found to be performing yoga. Prasanthi and Amirthaveni (2013) reported that more than 95 per cent of the hyperlipidemic subjects were engaged in doing some or the other exercise. Even in the present study more than 86 per cent of the selected hyperlipidemic subjects were following some or the other exercise pattern daily. Exercise helps and plays an important role as that of diet and medicine. People with hyperlipidemia who exercise regularly requires less medicine, as it lowers the blood pressure and serum cholesterol. So the lifestyle changes inturn helps in many ways to live and lead a healthy life (Prasanthi and Amirthaveni; 2013).

Average intake of different foods per day by the selected hyperlipidemic men and women is presented in Table 6. Among the selected 30 hyperlipidemic subjects, an equal number of subjects were reported to be vegetarian (15) and non-vegetarian (15) and majority of the subjects were following three meal pattern.

Consumption of cereals and pulses per day by the selected hyperlipidemic men was 312 g and 54 g while it was 259 g and 58 g respectively by women. Intake of green leafy vegetables (g), other vegetables (g) and roots and tubers (g) was found to be 40, 92 and 63 respectively by the hyperlipidemic men. The respective values recorded for the intake of corresponding foods by hyperlipidemic women were 55, 87.5 and 51.5. The hyperlipidemic men and women were found to be consuming on an average 153 ml and 243 ml of milk and milk products, 20 g and 23 g of fruits, 24 g and 23.75 g of fats and oil and 9 g and 11.25 g of sugar and jaggary respectively. It is obvious from the results that on an average the intake of cereals, other vegetables, roots and tubers, fats and oils were more by hyperlipidemic men than that of the women. On the other hand, the daily intake of pulses, green leafy vegetables, milk and milk products, fruits and sugar and jaggary was more by the hyperlipidemic women.

In conclusion, it can be said that the consumption of pulses, green leafy vegetables, milk and milk products, fruits and sugar and jaggary was found to be more by the hyperlipidemic women than those by hyperlipidemic men. However the mean intake of different foods between men and women did not differ significantly. Premakumari and Haripriya (2010) also studied the food and nutrient intake of obese patients having higher lipid profile. The values reported for the intake of milk and milk products and fat was found to be more than that of values recorded in the present study. On the other hand, intake of cereals, green leafy vegetables and other vegetables was more

by the hyperlipidemic subjects of present study while consumption of pulses and fruits was almost same.

The mean values of different nutrients supplied from the daily diet consumed by the hyperlipidemic subjects are given in Table 7.

The amount of energy (Kcal), protein (g), fat (g), iron (mg), calcium (mg), β -carotene (μ g), thiamine (mg), riboflavin (mg), niacin (mg) and vitamin C (mg) supplied from the diet of the selected hyperlipidemic men was 1939.76, 62.12, 50.31, 19.29, 589.47, 2057.94, 1.8, 0.95, 19.3 and 51.56 respectively. The respective values of the corresponding nutrients for the women were 1843.74, 60.75, 55.14, 17.11, 748.27, 2882.2, 1.6, 0.97, 16.5 and 63.48. The results also indicated that the amount of energy, protein, iron, thiamin and niacin provided from the diet consumed by hyperlipidemic men were found to be more than that by hyperlipidemic women. On the other hand, the intake of nutrients like fat, calcium, β -carotene (μ g), riboflavin and vitamin C was more by the women as compared to men. Moreover significant difference was not observed between mean intake of all the nutrients supplied from the diet consumed by the selected hyperlipidemic men and women.

It was found that the values recorded for intake of energy by the hyperlipidemic subjects was almost same with the values reported by Kuriyan *et al.*, (2010) whereas a study conducted by Premakumari and Haripriya (2010) indicated higher values for energy intake by the obese subjects having higher lipid profile values. The values obtained for protein intake in the present study found to be higher than the values reported by Kuriyan *et al.*, (2010) and Premakumari and Haripriya (2010). Kuriyan *et al.*, (2010) revealed that fat intake by the hyperlipidemic subjects was less while Premakumari and Haripriya (2010) reported more intake of fat than the values recorded in the present study.

Per cent of adequacy in the intake of different nutrients per day by the selected hyperlipidemic subjects is given in Table 8.

The adequacy (%) of the nutrient intake by the selected hyperlipidemic subjects for energy (Kcal), protein (g), fat (g), iron (mg), calcium (mg), β -carotene (μ g), thiamine (mg), riboflavin (mg), niacin (mg) and vitamin C (mg) was 84, 103, 201, 113, 98, 43, 150, 68, 121 and 129 per cent respectively. whereas, corresponding values of the nutrients among hyperlipidemic women were 97, 110, 276, 81, 125, 60, 160, 88, 137 and 159 respectively.

The values of percent adequacy in the intake of energy and protein by the men and women varied from 84 to 103 and from 97 to 110 respectively. The

per cent adequacy values of the intake of both the nutrients by the women were found to be more than those by men. Adequacy (%) of fat in the diet of women (276) was more than men (201). The values of adequacy (%) in the intake of iron was less by the women while it was more by the men, but it was vice-versa with regard to the per cent adequacy in the intake of calcium. The diet was grossly deficient in supplying β -carotene followed by riboflavin in both men and women. The per cent adequacy of β -carotene and riboflavin was more among women (60 and 88) than that of men (43 and 68) but it was not significant. On

the other hand, it is evident from the results that the diet consumed by the hyperlipidemic men and women was more than adequate in supplying protein, fat, thiamin, niacin and vitamin C.

In conclusion, it is evident from the results that the diet consumed by the selected hyperlipidemic men and women was more than adequate in providing maximum nutrients in needed amounts as per the recommended dietary allowances for adults specially the adequacy (%) of fat intake was highest among the nutrients.

Table 1: Socio-economic status of the selected hyperlipidemic subjects (n=30)

Socio-economic factors	Hyperlipidemic subjects	
	Number	Per cent
Age in years		
40-50	15	50.00
>50-60	15	50.00
Sex		
Male	12	40.00
Female	18	60.00
Type of the family		
Joint	10	33.33
Nuclear	20	66.66
Educational status		
Illiterate	2	06.66
School education	7	23.33
Higher secondary	5	16.66
Graduate	8	26.66
Post-graduate	8	26.66
Monthly family income		
Rs. \leq 10000	1	03.33
Rs. 10000 - Rs. 25000	9	30.00
Rs. > 25000 to \geq 50000	20	66.66
Occupation		
Homemaker	11	36.66
Service	13	43.33
Business	6	20.00

Table 2: Family history of various diseases among the selected hyperlipidemic subjects (n=30)

Particulars	Hyperlipidemic subjects	
	Number	Per cent
Hyperlipidemia		
Inherited from father	09	30.00
Inherited from mother	11	36.66
Blood pressure	17	56.66
Heart disease	03	10.00
Acidity	13	43.33

Table 3: Information regarding health complications experienced by the selected hyperlipidemic subjects (n=30)

Particulars	Hyperlipidemic subjects	
	Number	Per cent
Blood pressure fluctuations	23	76.66
Heart surgery	03	10.00
Brain stroke	02	06.66
Breathlessness	21	70.00
Dizziness	20	66.66

Table 4: Awareness regarding hyperlipidemia among the selected hyperlipidemic subjects (n=30)

Particulars	Hyperlipidemic subjects	
	Number	Per cent
What is hyperlipidemia?	17	56.66
Causes of hyperlipidemia	12	40.00
Information acquired from		
News paper	18	60.00
Television	11	36.66
Magazine	15	50.00
Physician	30	100.0

Table 5: Prevailing exercise pattern among the selected hyperlipidemic subjects (n=30)

Particulars	Hyperlipidemic subjects	
	Number	Per cent
Exercise pattern		
Daily	24	86.66
Twice a week	02	06.66
Type of exercise		
Walking	24	86.66
Running	02	06.66
Yoga	10	33.33
Sports	03	10.00

Table 6: Average daily intake of different foods by the selected hyperlipidemic subjects (n=30)

Food group (g)	Average amount of food intake by the selected hyperlipidemic subjects		‘t’ Value
	Mean \pm SD	Mean \pm SD	
	Men (n=12)	Women (n=18)	
Cereals	312.5 \pm 78	259.5 \pm 51.65	2.07 ^{NS}
Pulses	54.5 \pm 32.36	58.25 \pm 36.28	0.29 ^{NS}
Green leafy vegetables	40 \pm 61.46	55 \pm 79.30	0.58 ^{NS}
Other vegetables	92 \pm 73.76	87.5 \pm 83.59	0.15 ^{NS}
Roots and tubers	63 \pm 37.73	51.5 \pm 22.07	0.95 ^{NS}
Milk and milk product	153 \pm 89.32	243 \pm 157.91	1.98 ^{NS}
Fruits	20 \pm 33	23 \pm 45.77	0.20 ^{NS}
Fats and oils [#]	24 \pm 2.10	23.75 \pm 2.57	0.29 ^{NS}
Sugar and jaggary	9 \pm 2.10	11.25 \pm 7.58	1.19 ^{NS}

NS - Non significant # - Visible fat only

Table 7: Average intake of different nutrients per day by the selected hyperlipidemic subjects (n=30)

Nutrient	Mean value of different nutrient intake by the selected hyperlipidemic subjects		‘t’ Value
	Mean \pm SD	Mean \pm SD	
	Men (n=12)	Women (n=18)	
Energy (Kcal)	1940 \pm 229	1844 \pm 226	1.12 ^{NS}
Protein (g)	62 \pm 10.66	61 \pm 10.1	0.35 ^{NS}
Fat (g)	50.31 \pm 4.78	55.14 \pm 14.41	1.31 ^{NS}
Iron (mg)	19.29 \pm 5.89	17.11 \pm 7.03	0.91 ^{NS}
calcium (mg)	589.47 \pm 253	748.27 \pm 245	1.70 ^{NS}
β - carotene (μ g)	2057.94 \pm 1897	2882.2 \pm 3806	0.78 ^{NS}
Thiamine (mg)	1.8 \pm 0.38	1.6 \pm 0.3	1.53 ^{NS}
Riboflavin (mg)	0.95 \pm 0.22	0.97 \pm 0.24	0.23 ^{NS}
Niacin (mg)	19.3 \pm 3.61	16.5 \pm 3.48	2.11 ^{NS}
vitamin C (mg)	51.56 \pm 37.25	63.48 \pm 48.94	0.75 ^{NS}

NS - Non significant

Table 8: Per cent adequacy in the intake of different nutrients per day by the selected hyperlipidemic subjects (n=30)

Nutrient	Adequacy (%) of nutrients in the diet of the selected hyperlipidemic men and women		'Z' Value
	Men (n=12)	Women (n=18)	
Energy (Kcal)	84	97	1.25 ^{NS}
Protein (g)	103	110	0.69 ^{NS}
Fat (g)	201	276	1.12 ^{NS}
Iron (mg)	113	81	5.58 ^{**}
Calcium (mg)	98	125	2.02 ^{NS}
β - carotene (μg)	43	60	0.94 ^{NS}
Thiamine (mg)	150	160	0.29 ^{NS}
Riboflavin (mg)	68	88	1.34 ^{NS}
Niacin (mg)	121	137	0.75 ^{NS}
Vitamin C (mg)	129	159	1.02 ^{NS}

NS-Non significant**-Significant at 1 per cent level

Conclusion

On the whole, results indicated that among selected hyperlipidemic subjects, maximum subject experienced blood pressure fluctuation followed by breathlessness and dizziness. More number of subjects was aware about the meaning and causes of hyperlipidemia and physician was the main source for acquiring the information.

Maximum number of hyperlipidemic subjects performed daily walking as an exercise pattern followed by yoga and sports. Consumption of pulses, green leafy vegetables, milk and milk products, fruits and sugar and jaggary was found to be more by the hyperlipidemic women than those by hyperlipidemic men. However the mean intake of different foods between men and women did not differ significantly. The diet of the selected hyperlipidemic men and women was adequate in providing maximum nutrients in needed amounts as per the recommended dietary allowances for adults specially the adequacy (%) of fat intake was highest among the nutrients. This may be one of the important causes for occurrence of hyperlipidemia among the selected subjects. Hence lifestyle and dietary pattern needs to be modified to lead a healthier life by the hyperlipidemics.

Acknowledgement

The corresponding author express her sincere sense of obligations and acknowledgement to the Department of Science and Technology (DST), Government of India for providing financial assistance received under the grant No.DST/INSPPIRE Fellowship/2012/257 in the form of DST-INSPIRE fellowship.

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