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Assessment of Socio Economic, Nutritional and Atherogenic Profile of Respondents Suffering from Coronary Artery Disease in a Cardiology Institute of Bangalore

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ABSTRACT

Eighty eight respondents suffering from coronary artery disease in a Cardiology institute of Bangalore were selected by purposive sampling to assess socio economic, nutritional status and lipid profile to correl the impact on their atherogenic conditions. It was observed that maximum (45.4%) number or respondents belonged to 50-59 years age group. The socio-economic and demographic risk factors were correlated with the atherogenic parameters of the study sample such as lower socio economic status, big size of family and sedentary work life. Maximum number of respondents had the paternal type of family history of heart disease and prime associated disease conditions observed were obesity, hypertension and diabetes type II. Non vegetarians were maximum in number, two meals per day was the highly observed pattern of dietary consumption. Tobacco chewing was the only habit reported. Consumption pattern of preserved foods was more frequent. Fried foods and sweets were less restricted. However all had restricted salt. Lifestyle pattern of physical inactivity predominantly present among the subjects predisposed them to more risk of disease. Mean nutrient intake assessed by dietary recall method indicated that overall intake of protein, fat and calcium were significantly higher than RDA among respondents ($P<0.05$). Anthropometric measurements were observed to be higher which reflected in the enhanced respective anthropometric indices such as BMI and WHR averaged more than the desired normal level as per WHO classification indicating prevalence of overweight and abdominal obesity. The mean serum lipid levels indicated hyperlipidemia characterized by higher total cholesterol, triglyceride levels and lower levels of HDL-C that reflected in higher risk ratio of blood lipids indicating dyslipidemia prevailing among them. The correlation regressed between the atherogenic risk factors had revealed the strong association between elevated anthropometric indices and lipid parameters as the predominant risk indicators.

Keywords: Coronary artery disease, Females, Nutrient intake, BMI, Atherogenic profile, Dyslipidemia

CARDIOVASCULAR diseases (CVDs) have now become the leading cause of mortality in India. A quarter of all mortality is attributable to CVD. Ischemic heart disease and stroke are the predominant causes and are responsible for >80 per cent of CVD deaths. The Global Burden of Disease study estimate of age-standardized CVD death rate of 272 per 100000 population in India is higher than the global average of 235 per 100000 population (WHO, 2013). They are considered to be multi factorial disease where in hypertension, central obesity, non-insulin dependent diabetes mellitus [NIDDM], dyslipidemia and smoking habits play a dominant role in its etiopathogenesis. On account of rapid industrialization, socio economic development and increased life expectancy, there is an increase in diseases related to diet and lifestyle pattern. Clinical and epidemiological evidence has demonstrated the many common links between nutritional factors and chronic degenerative diseases such as coronary heart disease, diabetes and cancer. The epidemic of cardio vascular diseases (CVD), especially coronary artery disease (CAD) is emerging in rural India and accelerating in urban India. On account of rapid industrialization, socio economic development and increased life expectancy, there is an increase in diseases related to diet and lifestyle pattern. The preventive role of correct nutrition is well acclaimed. The type of diet is a major contributory factor in the development, progression or prevention of CAD, which needs to be modified suitably.

The report on causes of death by the Registrar General of India also reported cardiovascular diseases (CVD) as the most important cause of death in women. According to available statistics, of the more than 10 million deaths annually in India, almost two million are due to diseases of circulatory system, of which 40 per cent are women (Dorairaja *et al.*, 2016). Among women, these diseases are the major cause of death in the middle age, in urban and in rural women living in poor or rich states. More than half of the 800,000 annual CVD deaths in women occur prematurely. Women in pre-menopausal period are less prone to coronary artery disease than their male counterparts of the same age in view of protection offered by female hormones. However, this advantage is lost for smokers and patients with diabetes. Working women often do not find time for daily exercise (Bhatt *et al.*, 2015). This makes them prone to obesity, hypertension, diabetes etc. which are strong risk factors for coronary artery disease.

Though women are less prone to heart diseases up to menopause stage, associated factors and nutritional status may contribute to the onset and rapid progression of the coronary artery diseases. Prevalence of risk factors may hasten the progression of CAD and its consequences once they attain menopause. Hence the objective of the study was to assess and correlate the impact of socio-economic, nutritional status and associated factors such as, dietary intake and lipid profile on the CAD conditions.

Material and Methods

Eighty eight Coronary artery disease respondents (Inpatients and Outpatients) who were angiographically proven to have CAD were selected by purposive sampling from Sri Jayadeva Institute of Cardiovascular sciences and Research, Bengaluru. A pre tested schedule was used to collect the information regarding socio-economic profile, occupational status, educational level, family history of diseases, associated disease conditions, dietary pattern, monthly expenditure pattern on food and other things, habits etc. Lipid profiles were analyzed by standard laboratory techniques in the hospital lab and the data was utilized.

Anthropometric measures are assessed by standard procedures (Jelliffe,1991) and respective indices were assessed by standard formulae. BMI of the patients were calculated by dividing weight (kg) by square of height (meter). W/H ratio was computed by division of waist circumference by respective hip circumference of the subjects. Dietary intake was collected by three day recall method for three consecutive days with the help of standard vessel set. The nutrient intake was calculated using Nutri guide software developed by ICAR, New Delhi (Nutri Guide, ICAR, 2002). Recommended dietary allowance (RDA) for Indian adult was considered for computing per cent adequacy of nutrients (ICMR, 1981) using the formula.

$$\text{Nutrient adequacy (\%)} = \frac{\text{Nutrient Intake}}{\text{RDA of the nutrient}} \times 100$$

Results and Discussion

Socio-econimic and Nutritional status of subjects

The results revealed that the subjects were in the range of 35-69 years of age group. It was observed that 3, 15, 40 and 30 subjects belonged to 30-39, 40-49, 50-59 and 60-69 years age groups respectively. Maximum number of subjects (45.4 per cent of subjects) belonged to 50-59 years age group followed by 60-69 years group (34.1%). Meager number (3.4%) were in 30-39 years age group and 17 per cent in 40-49 years age group. Similar findings about the higher prevalence of CAD in older population is evident in the research done by Singh and Choudhry (2007). The socio economic profile is depicted in Table 1. Maximum number (42.06%) had studied up to primary / middle school level. Higher per cent (35.2%) had no school education. 18.8 per cent subjects had studied up to SSLC and 3.4 per cent were graduates. None of the female subjects were postgraduates.

The occupation of the subjects or that of the head of the family was considered. Maximum patients were from families having occupation in private sectors with low income (39.77%). As much as 17.05 per cent and

TABLE 1

Distribution of female CAD patients based on Socio-economic profile

Parameters	Subjects 30-39 yrs (n=3)		40-49 yrs (n=15)		50-59 yrs(n=40)		60-69 yrs (n=30)		Total (n=88)	
	n	%	n	%	n	%	n	%	n	%
Occupation										
Agril. Labourer	-	-	1	6.67	5	12.50	9	29.97	15	17.05
Pvt. (LIG)	1	33.33	10	66.67	16	40.00	8	26.69	35	39.77
Pvt. (HIG)	-	-	-	-	6	15.00	4	13.32	10	11.36
Business	-	-	2	13.33	3	7.50	3	10.00	8	9.09
Govt. Employee	-	-	-	-	6	15.00	2	6.67	8	9.09
Farmer	2	66.67	2	13.33	4	10.00	4	13.35	12	13.64
Marital status										
Married	3	100.00	15	100.00	37	92.50	30	100.00	85	96.59
Unmarried	0	0.00	0	0.00	3	7.50	0	0.00	3	3.41
Religion										
Hindu	3	100.00	11	73.30	33	82.50	25	83.35	72	81.82
Muslim	0	0.00	4	26.70	7	17.50	3	9.99	14	15.91
Christian	0	0.00	0	0.00	0	0.00	2	6.66	2	2.27
Residence										
Rural	1	33.33	5	33.33	10	25.00	12	40.00	28	31.82
Urban	2	66.67	10	66.67	30	75.00	18	60.00	60	68.18
Land Holding										
Land less	2	66.67	8	53.33	25	62.50	17	56.67	52	59.10
£ 1.5 acres	1	33.33	4	26.67	11	27.50	8	26.67	24	27.30
1.5-5 acres	0	0.00	1	6.67	3	7.50	3	10.00	7	7.95
> 5 acres	0	0.00	2	13.33	1	2.50	2	6.66	5	5.68
Dietary type										
Vegetarian	1	8.30	1	2.85	19	31.66	6	37.5	27	21.95
Non vegetarian	11	91.70	34	97.15	41	68.34	10	62.5	96	78.05
Dietary pattern (Meals/day)										
2 meals	3	24.9	11	31.42	38	63.30	10	62.5	62	50.4
3 meals	5	41.65	18	51.42	20	33.30	4	25.05	47	38.22
4 meals	4	33.36	6	17.16	2	3.40	2	12.50	14	11.38
Disease History										
Nil	1	33.33	5	33.33	12	30.00	15	50.00	33	37.50
Paternal	2	66.67	7	46.67	16	40.00	10	33.33	35	39.77
Maternal	0	0.00	3	20.00	12	30.00	5	16.67	20	22.73
Associated Diseases*										
Obesity	0	0.00	8	53.33	20	50.00	7	23.33	35	39.77
Hypertension	2	66.67	2	13.33	18	45.00	8	26.66	30	34.09
NIDDM	1	33.33	1	6.66	14	35.00	7	23.33	23	26.14

* Multiple answers: do not add to100

13.64 per cent of total female subjects were from families working as agricultural laborers and farmers respectively. It is also evident from the above results that lower incidence was observed in female subjects of business and government employees' families (9%). Higher incidence of disease among females working in private sector (LIG) and agricultural laborers could be attributed to the chronic drudgery and lower economic stress faced by women counter parts in the family to maintain household work. Lower incidence among female subjects of business and government employees' families could be attributed to the better economic security and social conditions. However, 11.3 per cent females belonged to families engaged in private business with high income. Maximum number of subjects were sedentary workers. Tobacco chewing was the only habit observed.

Majority of the female subjects belonged to joint families (50%). It was observed that 29.5 per cent women were from large families comprising 7-8 members followed by those with a family size of 5-6 members (28.4%). However, 21.6 per cent females had family size of 2-4 members. Majority of the subjects belonged to families with monthly income Rs.10,000-20,000, followed by those with monthly income of Rs.20,000-50,000. A meager number of (4.5%) females were with monthly income of more than 1 lakh and also to that of monthly income more than 2 lakhs. Hence higher economic level might provide better educational status and awareness to reduce the incidence of disease.

Majority of female subjects (96.6%) were married and maximum belonged to Hindu religion (81.8%). Fewer incidences of disease among Muslims (15.9%) and meager number of Christians (2.27%) was observed. Majority were urban dwellers (68.8%). When the land holdings of the family were considered, majority of women belonged to landless families followed by 27.3 per cent from the families owning 1.5 acres (27.3 %). Least number were from the families having >5 acres (5.68 %). Hence, the data of lower socio-economic status and associated factors like poor educational status and sedentary occupational pattern were correlated with the higher incidence of disease among respondents.

The dietary pattern of female subjects revealed high prevalence of CAD among non vegetarians (68.2%). However, in younger age group *i.e.,* 30-39 years, majority were vegetarians (66.7%). Two meals per day was observed in maximum number of female subjects (59.1%) followed by 37.48 per cent consuming three meals per day. These observations confirmed the impact of modified dietary pattern and type of diet among the population which had aggravated the incidence of disease. The lifestyle pattern indicated sedentary work pattern prevailing among majority of females (20.45%). Only 9.09 percent females were heavy workers. Lack of physical activity along with absence of any exercise was also observed by majority of females (46.59%) and lesser number of women were doing regular exercise (13.63). Meditation was observed to be practiced by 26.00 per cent followed by yoga. Tobacco consumption was the only habit found among 40.91 per cent of the females.

Data on family medical history revealed that maximum respondents (39.7%) had the paternal type of family history compared to maternal type history indicating a strong familial link observed for the history of CAD/MI. Maximum number had obesity (39.7%) followed by hypertension (34.1%) and 26.1 per cent were associated with type II diabetes showing higher prevalence of metabolic risk factors and associated disease conditions as reported by Gokhroo *et al*., 2009 and Dorairaj *et al.*, 2016.

Respondents were also observed to consume higher percent of snack items specially preserved foods like pickles, jams, murabba and papads (Table 2). Maximum women were consuming fried snacks weekly (36.16%) followed by monthly (35.03 %). The number of female subjects consuming fried snacks twice a week was 17 (19.21) and that of daily consumed was 8 (9.04%). Majority of women were consuming bakery items monthly once (51.98%) followed by twice a week (24.86%). However, 16.95 and 5.65 per cent women were consuming bakery products on weekly and daily basis respectively.

TABLE 2

Consumption pattern of snacks of female CAD patients

Snacks	Female subjects (n=88)							
	Daily		Twice a week		Weekly		Monthly	
	No.	%	No.	%	No.	%	No.	%
Fried items	8	9.04	17	19.21	32	36.16	31	35.03
Bakery items	5	5.65	22	24.86	15	16.95	46	51.98
Preserved foods	21	23.73	18	20.34	32	36.16	17	19.21
Chats/pizzas	0	0.0	13	14.69	33	37.29	42	47.46

Note: Multiple answers do not add to 100

Preserved foods were consumed more frequently *i.e.,* daily and twice a week by 23.73 and 20.34 per cent women respectively where as 36.16 and 19.21 per cent were consuming weekly and monthly. The frequency of consumption of chats / pizza was on weekly twice, weekly and monthly by 14.69, 37.29 and 47.46 per cent of women respectively. However, majority of them have informed about restriction of salt, oily foods and sweets based on medical advice given by the doctors.

The mean intake of protein for the female subjects was more than RDA of 50 gm (55.59g/day) with a per cent adequacy of 111.18±9.86 as indicated in Table 3. The mean intake was higher for 30-39 years *i.e.,* 54.33 g with adequacy of 90.7 per cent. For other age groups the mean intake ranged from 41.7-46.8 g with per cent adequacy of 69.7-78.2. The mean intake of fat ranged from 33.2 to 41.8 g for all the age groups with a mean intake of 45.26 g for all the subjects. The per cent adequacy ranged from 166.3 to 209.4 for all the age groups showing the consumption of fat is higher that the RDA. The consumption of fibre was in the range of 12.48 to 14.21 g for all the age groups with an overall mean of 14.02±6.30g. That clearly indicated the inadequacy of fibre content ranging from 41.6 to 47.4 per cent with an overallmean 44.8 per cent.

The carbohydrates intake was less than the RDA with a range of 287.2 - 358.8 g and per cent adequacy of 79.7 to 99.6 per cent. The mean intake of energy was higher than the RDA (1875 K.cals) with a range of 2006 -2060 K.cals and per cent adequacy 104 -

TABLE 3

Mean nutrient intake and per cent adequacy in comparison with RDA of female CAD patients

Nutrients	RDA	Mean intake	Per cent adequacy	Z value
Protein (g)	50	55.59 ± 4.93	111.18 ± 9.86	10.75 *
Fat (g)	20	45.26 ± 5.76	249.38 ± 9.86	41.1 *
Fibre (g)	30	13.45 ± 5.07	44.84 ± 16.91	-30.65
Carbohydrates (g)	360	337.07 ± 31.61	93.60 ± 8.78	-18.3
Energy (Kcal)	1875	2148.81 ± 226.35	114.60 ± 12.07	81.0 *
Calcium (mg)	400	601.31 ± 181.52	150.33 ± 45.38	8.34 *
Iron ()	28	23.67 ± 5.31	84.53 ± 18.56	-7.59

* Significant (P< 0.05)

109 per cent respectively. The mean intake of energy was 2148 K.cals and per cent adequacy of 114.6 was observed. Calcium intake was also higher than RDA i.e. a mean intake of 601.31mg with per cent adequacy of 150.3.The mean intake of iron was in a range of 20.4 to 24.7 mg per cent adequacy 73.1 to 88.3. However, the mean intake of iron was 23.6 mg with 84.5 per cent of adequacy. The mean intake and percent adequacy of fat and calories were found to influence the incidence of the disease as reported by Mehan *et al.,* 2008. The overall intake and adequacy of protein, fat, energy and calcium nutrients was significantly higher ($P<0.05$) as which also indicated lower adequacy of iron. The incidence of CAD among females could be attributed to the frequent consumption of snack items and preserved foods which might have lead to higher nutrient intake of fat and calories.

The diet of an average man should provide the recommended percent of calories from the three macro nutrients as 10-15 per cent from protein, 20-25 per cent from fat and 60-65 per cent from carbohydrates (ICMR, 2010). Among the younger age groups, it was observed that the contribution of calories were in the recommended level by protein and fat, but more by carbohydrates than the recommended. As observed in Table 4.

The per cent contribution of calories was 11.5 per cent from protein, 19 per cent from fat and 71 per cent from carbohydrates in the subjects of 30-39 years. Among 40-49 years age group, the calorie contribution from protein, fat and carbohydrates was 11.7, 22.4 and 65.9 per cent for female subjects. In the age group of 50-59 years, the calorie contribution from protein and fat was more *i.e.,* 11.0 and 20.4 per cent, respectively and it was less from carbohydrates (68.6%). An inverse trend was observed in the age group of 60-69 years, as the percent contribution of calories from protein and fat was less *i.e.,* 9.5 and 20.5 respectively compared to carbohydrates (70.0%). The overall contribution of calories by fat was found to be higher than the recommended *i.e.,* 10-15 per cent of total calories.

TABLE 4

Per cent contribution of calories from protein, fat and Carbohydrates from mean daily diet of female CAD patients

Age group	Subject	No.	Contribution to calories (%)		
			Protein	Fat	Carbo hydrates
30-39 yrs	Female	3	10.0 ± 0.26	19.0 ± 0.17	71.0 ± 3.13
40-49 yrs	Female	15	11.7 ± 1.16	22.4 ± 2.23	65.9 ± 4.08
50-59 yrs	Female	40	11.0 ± 1.20	20.4 ± 3.04	68.6 ± 4.64
60-69 yrs	Female	30	9.5 ± 1.02	20.5 ± 2.32	70.0 ± 6.45
Over all	Female	88	10.4 ± 1.02	19.0 ± 2.33	70.6 ± 6.46

The mean daily intake of different types of fats by the subjects as presented in Table 5 revealed that contribution of visible fat to the daily intake of total fat is greater among both male and female subjects. The mean daily intake of visible fat was significantly higher for both male and female *i.e.,* 48.1 and 45.3 g, respectively compared to RDA (20 g). The average intake of total fat was significantly higher ($P<0.05$) in both the subjects as compared to RDA (30g).

TABLE 5

Mean daily intake of different type of fats by the female CAD patients

Type of fat (gm)	RDA	Female (n=88)	Z value
Non visible fat	10	13.7 ± 5.95	-5.9
Visible fat	20	45.3 ± 5.76	41.4 *
Total fat	30	59.0 ± 17.6	15.4 *

* ($P<0.05$)

Anthropometric measurements and indices

The mean anthropometric data of female subjects as shown in Table 6 indicated that mean weight ranged from 52.5 kg to 59.7 kg for all the age groups with an

TABLE 6

Mean anthropometric measurements of the female CAD patients

Anthropometric measurements	Female subjects (n=88)					
	30-39 yrs	40-49 yrs	50-59 yrs	60-69 yrs	Overall	't'value
Weight (Kg)	52.5 ± 4.77	60.5 ± 7.47	59.7 ± 9.09	58.5 ± 9.31	59.2 ± 8.81	7.91 *
Height (cm)	153.0 ± 6.33	155.0 ± 4.52	154.0 ± 6.33	153.0 ± 5.59	154.0 ± 5.76	9.87 *
MUAC (cm)	25.17 ± 3.33	28.5 ± 3.06	28.6 ± 2.78	28.7 ± 2.70	28.5 ± 2.84	0.96
Waist circumference (cm)	82.8 ± 5.20	87.6 ± 8.67	88.0 ± 7.01	84.9 ± 6.02	86.7 ± 7.02	0.75
Hip circumference (cm)	87.3 ± 4.16	91.3 ± 7.98	91.9 ± 10.10	88.3 ± 9.20	90.4 ± 9.36	-2.1

* Significant at 5% level

overall mean of 59.2 kg ±8.81 which was more than the weight of reference women (50 kg). The higher consumption of protein, fat and frequent consumption of preserved foods by majority of female subjects might be the reason for higher mean measurements of anthropometry. The mean height ranged from 153-155 cm and mean MUAC measurements ranged from 25.17 to 28.7 cm. The overall mean of MUAC was 28.5±2.84. The range of mean waist circumference was 82.8 to 88.0 cm with an overall average of 86.7 cm. The hip circumference (cm) ranged from 87.3 to 91.9 cm with a overall mean of 90.4 cm.

Mean anthropometric indices as depicted by Table 7 revealed that mean BMI values were in the normal range of 18-24.9 only in the female subjects of 30-39 year age group (22.3±1.26). For the other age groups, mean values were slightly higher than values in the range of 25.0-25.1, indicating grade-I obesity. However, the mean BMI of overall subjects was also in the higher BMI range of grade-I obesity (25.0±2.95).

Higher mean weight with lower mean height of females might be the reason for overweight status as compared to males. The waist to hip ratio (WHR) was in the range of 0.95 to 0.97 which is on higher side of normal showing the presence of risk factor. Variance assessed by paired t-test between overall mean values of anthropometric data revealed that weight and height parameters differed significantly ($P<0.05$) which was reflected in the incidence of obesity and abdominal adiposity.

The classification based on anthropometric indices of female subjects elucidated that majority of the female subjects (55.68%) were having BMI of normal range (Table 8). Only 1.13 per cent women were under weight with BMI of <18.5. subjects considered as obese of grade I were 35.23 per cent(having BMI of 25.1 to 30.0) and 7.96 subjects were obese of grade II (BMI of 30.0-39.9). Maximum number of women in all the age group had higher waist to hip ratio of 0.80 and above with an overall per cent of 97.73 per cent. The waist circumference was also in the risk level for female subjects to be 0.80 and above.

TABLE 7

Mean anthropometric indices of the female CAD patients

Anthropometric indices	Female subjects (n=88)					
	30-39 yrs	40-49 yrs	50-59 yrs	60-69 yrs	Overall	't'value
BMI	22.3 ± 1.26	25.1 ± 2.32	25.1 ± 2.89	25.0 ± 3.37	25.0 ± 2.95	2.47 *
W/H Ratio	0.95 ± 0.10	0.96 ± 0.08	0.96 ± 0.07	0.97 ± 0.08	0.96 ± 0.07	3.35 *

* Significant at 5% level

TABLE 8

Classification of female CAD patients based on anthropometric indices

Clasifications	Female Subjects 30-39 yrs (n=3)		40-49 yrs (n=15)		50-59 yrs(n=40)		60-69 yrs (n=30)		Pooled (n=88)	
	No.	%	No.	%	No.	%	No.	%	No.	%
BMI										
<18.5 Under weight	0	0.00	1	6.67	0	0.00	0	0.00	1	1.13
18.5-24.9 Normal	3	100.0	6	40.00	24	60.00	16	53.33	49	55.68
25.0-29.9 Obesity: Grade-I	0	0.00	8	53.33	13	32.50	10	33.33	31	35.23
30.0-39.9 Obesity: Grade-II	0	0.00	0	0.00	3	7.50	4	13.34	7	7.96
>40 Obesity: Grade-III	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
WHR										
<0.80 Normal	0	0.00	1	6.67	0	0.00	1	3.33	2	2.27
0.80 & above High	3	100.0	14	93.33	40	100.0	29	96.7	86	97.73
WC										
<80.0 Normal	1	33.33	3	20.00	5	12.50	8	26.63	17	19.32
80.0-87.9 Normal Risk Level-I	1	33.33	5	33.30	14	35.00	12	40.00	32	36.36
88.0 & above Risk Level-II	1	33.34	7	46.67	21	52.50	10	33.37	39	44.32

** WHO guidelines

The circumference of waist was more than 88 cm which indicated the risk level of II for 44.32 per cent and it was in the range of 80-87.9 cm (risk level I) for 36.36 per cent of female subjects. Only (19.32 %) of women had normal waist circumference. Similar findings were observed by Mehan *et al.* (2008) and Gokhroo *et al.* (2009) who reported of higher anthropometric measurements among women subjects. Assessment of nutritional anthropometry reveals that females were having higher mean weight than the weight of woman (50 kg) indicating the prevalence of overweight among the subjects studied.

Lipid profile of the subjects

Mean lipid profile among female subjects (Table 9) also revealed the elevated levels of serum cholesterol. However, the mean total cholesterol (TC) level was within the desirable level *i.e.,* 200 mg/dl for all the subjects with an overall average of 181.0±31.14 mg/dl. This might be due to the higher mean intake of

TABLE 9

Mean lipid profile of female CAD patients

Lipid profile (mg.dl)	30-39 yrs (n=3)	40-49 yrs (n=15)	50-59 yrs(n=40)	60-69 yrs (n=30)	Overall mean
Total cholesterol	179.0 ± 21.63	183.67 ± 31.41	190.9 ± 29.93	166.73 ± 29.08	181.0 ± 31.14
S. Triglycerides	138.3 ± 57.40	218.9 ± 39.76	206.4 ± 54.91	201.1 ± 83.08	204.0 ± 64.62
HDL-C	30.3 ± 3.16	32.7 ± 5.15	33.90 ± 6.45	33.72 ± 4.02	35.5 ± 5.39
LDL-C	113.7 ± 10.02	115.3 ± 29.13	110.5 ± 30.20	103.1 ± 26.18	108.9 ± 28.23
VLDL-C	19.6 ± 5.03	30.2 ± 6.44	31.8 ± 8.38	39.3 ± 26.72	33.7 ± 17.27
TC/HDL ratio	5.9 ± 0.96	5.7 ± 1.05	5.8 ± 1.29	4.9 ± 0.94	5.5 ± 1.18
LDL/HDL ratio	3.7 ± 0.12	3.3 ± 1.29	3.3 ± 1.14	3.1 ± 0.83	3.3 ± 1.05

protein and carbohydrate and lower fat intake. The mean serum triglycerides level was more than normal values *i.e.,* 150 mg/dl for all the age groups. The range of the same for other age group was 201.1 to 218.9 mg/dl and overall mean was 204.0±64.62 for all the female subjects. The mean HDL-C levels were less than the optimum level with a mean of 30.3 to 33.9 for the four age groups. This could be attributed to the higher per cent adequacy of fat and lower adequacy of fibre. The overall mean for all the subjects was 35.5±5.39 mg/dl. The mean lipid levels of LDL-C were above optimal level (100-129 mg/dl) in the subjects of all age groups with a range of 103.1 to 110.5 mg/dl. The overall mean LDL-C levels of all the female subjects were 108.9±28.23 mg/dl. The mean levels of very low density lipoproteins (VLDL-C) was in the higher range of 30.0 to 39.3 mg/dl for age group of 40 to 69 year age group where as for younger females same was within the normal range.

The risk ratio of TC:HDL was in a range of average risk of 4.5-7.0 with overall ratio of 5.5±1.18. LDL : HDL ratio was at border line risk of 3.7-6.0 range having overall average of 3.3±1.05. This has clearly indicated the impact of higher intake of visible fat and lower intake of fibre which might have reflected in higher concentration of low density lipoproteins and lower HDL levels in the serum to raise the risk ratio of serum lipid parameters. The borderline risk of LDL to HDL levels clearly indicated the escalated atherogenicity among males. The overall picture of lipid profile of female subjects depicted that dislipidemia has been the most common risk factor associated with patients studied. The coronary risk factors of hypercholesterolaemia among female subjects are indicated by the classification based on lipid profile as elucidated in Table. Maximum number (71.59%) were in the normal range of serum total cholesterol (<200 mg/dl) but 26.14 per cent were in borderline high range (200-239 mg/dl). The serum triglyceride values were in higher range of 200-499 mg/dl for 52.30 per cent females and 30.65 per cent were in borderline high range (150-199 mg/dl . Majority of female subjects were categorised as above optimal level of serum LDL-C levels and further 12.50 per cent had been categorised into higher range of 130-159 mg/dl levels. The HDL-C levels were in the lower range of <40 for 90.91 per cent female subjects. Only 7.95 per cent had optimum HDL-C levels showing increased risk of atherosclerosis due to high LDL combined with lower HDL levels. The VLDL-C levels were <30 for 56.80 per cent of subjects and >30 for 43.20 per cent subjects. The levels of TC/HDL-C ratio were in the range of average risk for maximum subjects (73.87%) and moderate risk for 7.95 per cent subjects. Maximum number of subjects had borderline risk of 3.1-6.0 for 57.95 per cent subjects. It was also evident that 39.77 per cent had desirable LDL/HDL ratio indicating less incidence of risk profile of blood lipid parameter.

The consumption of diet, especially fats and oils has direct relevance with the lipid profile of the human body. Dorairaja *et al.* (2016) reported that dietary fats on thrombosis and endothelial function as well as the relationship of plasma and tissue lipids to the pathways of inflammation. The serum lipid profile levels are considered as important risk indicators for CAD and it was observed that the average values of lipid profile of male and female subjects were in the higher range.

Univariate regression analysis between the atherogenic risk factors such as age, anthropometric measurements and lipid profile of female subjects revealed that increase in age positively correlated with serum triglycerides, HDL-C and VLDL-C levels at 5 per cent level (Table 10). Maximum association of 86 per cent was observed between weight and WHR which was highly significant at one per cent level. However, positive non significant association was observed between TC, S. Triglycerides, HDL-C and VLDL-C also with TC:HDL-C levels. It was evident that mid uppe rarm circumference had significant association with WHR ($P<0.01$) and BMI (0.05). Higher waist circumference and hip circumference also had significant association with WHR at one percent level. It was also observed that increased WHR has positive and significant impact on total cholesterol levels at 5 per cent level. The association was positive with other lipid parameters but was non significant. BMI has positively correlated with HDL-C, LDL-C and LDL:HDL ratio but it was not significant statistically. It was evident that enhanced anthropometric profile has atherogenic effect on the elevated lipid profile of respondents. The correlation regressed between the atherogenic risk factors had revealed the strong association between elevated anthropometric indices and lipid parameters as the predominant risk indicators.

It was concluded that the socio-economic and demographic risk factors were correlated with the atherogenic parameters of the study sample. Mean intake and per cent adequacy of the fat, carbohydrate and energy were observed to be more than RDA and type of fat specially visible fat overweighed the desirable level. Lifestyle pattern of physical inactivity predominantly present among the subjects predisposed them to more risk of disease. The atherogenic risk factors like elevated anthropometric parameters and lipid profile are prevailing among coronary artery disease respondents. There is a strong positive correlation between age, BMI, WHR and lipid profile which indicated that enhanced anthropometric profile has atherogenic effect on the elevated lipid profile of

TABLE 10

Correlation co-efficient between atherogenic risk factors among female CAD patients

Risk factor	Atherogenic factors among female subjects								
	TC	ST	HDL-C	LDL-C	VLDL-C	TC : HDL	LDL : HDL	WHR	BMI
Age	-0.12	0.06	0.09	-0.14	0.25 *	-0.19	-0.11	0.05	0.06
Weight	0.13	0.04	0.05	-0.03	0.17	0.06	-0.12	0.86 **	-0.04
Height	-0.16	0.06	-0.17	-0.17	0.04	-0.02	-0.14	0.16	0.06
MUAC	0.01	-0.07	-0.16	0.12	-0.02	0.10	0.13	0.59 **	0.21 *
WC	0.10	-0.08	0.02	0.02	-0.04	0.05	0.00	0.60 **	0.16
HC	0.20	0.04	0.01	-0.14	0.02	0.13	-0.12	0.55 **	-0.63
WHR	0.26 *	0.01	0.16	0.07	0.19	0.09	-0.06	1.00	-0.10
BMI	-0.15	-0.15	0.02	0.21	-0.06	-0.12	0.14	-0.10	1.00

female subjects. There is a need for education about nutrition to improve their knowledge, attitude and practice which consequently modifies their health status.

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