Original Article

Study of Lipid Profile in Postmenopausal Rural Women and Its Correlation with Carotid Intima Media Thickness

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ABSTRACT

Background : Incidence of atherosclerotic vascular diseases is increasing in our country with coronary artery disease as its prototype. Dyslipidemia is one of the important risk factor for atherosclerosis. Increased thickness of carotid artery intima and media is a reliable marker of atherosclerosis. Risk factors for atherosclerosis differ between urban and rural population as well as between pre and post menopausal women. Aim of this study was to evaluate lipid profile in postmenopausal rural women and correlate it with carotid intima media thickness

Methods : In this observational study 100 postmenopausal rural women were evaluated for lipid profile and its correlation to Carotid Intima Media Thickness (CIMT) was studied. Other conventional risk factors for Coronary Artery Disease (CAD) were also looked for in the study group

Results : Total 100 postmenopausal women coming from Rural area were analysed. Maximum females 43 (43%) were in age group of 51-60. 87% women had dyslipidemia. 3% women had abnormal CIMT (more than 0.9 mm). All women who had abnormal CIMT, also had abnormal lipid profile (chi square value of 73.01 with P value<0.001) That means sensitivity of lipid profile as a marker for abnormal CIMT was 100%; but reverse was not true. Of 87 women who had abnormal lipid profile, only 13 (14.9%) had abnormal CIMT so the specificity of lipid profile as a marker for abnormal CIMT was low (14.9%). Abnormal CIMT had a strong correlation with dyslipidemia but vice versa was not true.

Conclusion : Dyslipidemia is a major risk factor for atherosclerosis in postmenopausal women coming from rural background.

Key words : Dyslipidemia, CIMT, postmenopausal rural women

Introduction -

Vascular complications due to atherosclerosis are a major cause of morbidity and mortality. The incidence of coronary artery disease (CAD) is progressively increasing in our country and is the leading cause of death in India and the world over.[1] It has been suggested by the Atherosclerosis risk project that the atherosclerotic process occurs at the same time in carotid, cerebral and coronary arteries.[2] Thus measurement of carotid artery intima media thickness (CIMT) is an important marker of atherosclerosis.[2]

The risk factors for atherosclerosis and CAD are divided into non modifiable (age, male sex,

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heredity) and modifiable (diabetes, hypertension, dyslipidemia, smoking, obesity, sedentary lifestyle, stress) Most of these modifiable risk factors are related to lifestyle and therefore there is difference in incidence of CAD, diabetes and dyslipidemia in urban and rural population.[3]

Risk factor prevalence also differs in males and females. Premenopausal women due to the hormonal protection, are much less prone for hypertension, diabetes, dyslipidemia and CAD.[4] After menopause, the risk of developing these diseases gradually increases in women and by the age of 70, the risk becomes equal for men and women.[4] CIMT is regarded asa surrogate marker of atherosclerosis.[5]

There is scarcity of data regarding traditional risk factors of atherosclerosis in postmenopausal women in rural areas of central India, therefore the present study was undertaken to find out the prevalence of dyslipidemia, in postmenopausal women coming to

a tertiary care hospital from rural background and correlate it to CIMT.

Secondary aim of this study was to assess the prevalence of other CAD risk factors in this study group

Materials And Methods -

It was an observational study conducted in Dept. of Medicine at NKP Salve Institute of Medical Sciences, Nagpur, Tertiary care centre in central India, during May 2013 April 2014, with sample size of 100.

Total 100 postmenopausal women coming from rural area and admitted to medical wards of our hospital for any illness or attending out door department of Medicine during the study period of one year were included in the study irrespective of the duration of menopause.

Those women who were already on lipid lowering treatment, cases having secondary cause for dyslipidemia like Nephrotic syndrome, hypothyroidism, CKD & On Antiretroviral therapy were excluded from the study.

Study approval was taken from the institutional ethical committee. Informed written consent was taken from each participant before inclusion in the study.

A brief history of current illness & history of Diabetes Mellitus, hypertension, ischemic heart disease, stroke etc was noted in all study subjects. As per history of type of physical activity women were catogerised as sedentary or physically active group. Detailed dietary history was taken regarding , pure vegetarian, Non Vegitarian diet or mixed diet. Type and quantity of cooking oil consumed per person per month was noted. Details of habits like drinking alcohol, smoking, tobacco chewing & duration of menopause in each woman were noted down.

Physical examination and anthropometric measurements (height, weight, waist circumference, Body Mass Index) were done in all subjects.

Lab investigations like Fasting lipid profile, fasting and postlunch sugar, Hb, Blood urea, serum creatinine, Thyroid functions and Serum Uric acid tests were done from hospital laboratory. ECG was done in all. 2D Echo and CT brain was done wherever indicated.

CIMT was measured by using ultrasonography machine. Measurements were done on longitudinal section of common carotid artery at 1 cm distance from bifurcation of the artery with subject lying down head extended and slightly turned to opposite side of the artery examined. CIMT was measured on both sides and higher value was taken as CIMT. Values more than 0.9 mm were considered abnormal

Study Definitions -

Post menopausal women, those women in whom menstruation has ceased for one year or more (usually in 4th or 5th decade of life)

Carotid artery intima media thickness (CIMT) Carotid artery is the main artery in neck supplying blood to brain. Thickness of innermost layer (intima) and middle muscular layer (media) measured together by B mode ultrasonography machine is termed as CIMT. Values upto 0.9 mm are considered as normal, values more than 0.9mm are considered as raised CIMT and are indicative of atherosclerotic thickening of the artery.[6,7]

Dyslipidemia Abnormalities in serum lipid levels, measured after 12 hours overnight fast are termed as dyslipidemia.

Normal values of lipids as per modified National Cholesterol Education programme Adult treatment PannelIII (NCEP ATP III) guidelines[8]

Total Cholesterol (TC) up to 200 mgs%, Low Density Lipoprotein (LDL) cholesterol upto 130 mgs%, Triglycerides upto 150 mgs% and High Density Lipoprotein (HDL) cholesterol in females more than 50 mgs%

Results -

Out of 100 postmenopausal women studied. Maximum number of women 43 (43%) belonged to the age group 51 to 60 yrs. followed by 32 (32%) in age group 61 to70, 20 (20%) in age group 41 to 50 and 5 (5%) women were above 70 years of age. Average duration of menopause was 16.64 years.

Maximum women 59 (59%) were pure vegetarian while 41 (41%) women were consuming mixed diet. Soyabean oil was used as routine Cooking medium by most of the women ie 85 (85%) followed by use of groundnut oil 12% flaxseed (jawas) oil, 2% and palm oil 1%.

It was observed that 65 (65%) of the women were sedentary in postmenopausal period, while 35% women were still physically active. BMI was 25 to 29.9 in 35 (35%) women while 09 (9%) women had BMI of > 30.

Amongst traditional risk factors assessment Type II DM was seen in 32 (32%) women, Hypertension in 56 (56%) Coronary artery disease in 14 (14%) CVD (Cerebro vascular disease) in 04 (4%) and 27 (.27%) women had combination of 2 or more risk factors.

Dyslipidemia was seen in 87 (87%) subjects while in 13 (13%) subjects lipid profile was normal.

89 (89%) women had low HDL-C (< 50) while remaining had hypercholesterolemia, Hypertriglyceridemia & High LDL-C *(Table 1)*

In the assessment of CIMT value of <.9 mm was considered as normal. Only in 13 (13%) women CIMT was increased (>.9 mm) while CIMT was normal in 89 (89%) women. *(Table 2)*

Increased CIMT was found to be directly correlated with dyslipidemia but reverse was not seen *(Table 3)*. It was statistically significant. All 13 women who had abnormal CIMT were also having abnormal lipid profile. Chi square value for this was 73.01 with Pvalue<0.001.That means sensitivity of lipid profile as a marker for abnormal CIMT was 100%. But opposite was not true. Amongst 87 women who had abnormal lipid profile, only 13 had abnormal CIMT. So the specificity of lipid profile as a marker for abnormal CIMT was low. *(Table 3)*

The correlation of obesity and abnormal lipid profile and abnormal CIMT was not significant. Out of 44 obese, women (with BMI>25) 42 had abnormal lipid profile and 5 had abnormal CIMT; while out of 56 non obese women (BMI<25), 43 had abnormal lipid profile and 8 had abnormal CIMT. P value was 0.46, suggesting obesity is not a significant marker of abnormal lipids as well as abnormal CIMT.

No statistically significant correlation observed between traditional risk factors (Diabetes, CAD and CVD) abnormal lipid profile and abnormal CIMT except Hypertension P=.007 which was statistically significant for abnormal lipid profile but not for CIMT. Correlation between raised uric acid and abnormal lipids and abnormal CIMT was also found to be insignificant. *(Table 4)*

Dyslipidemia emerged as most prevalent CAD risk factors in this study subjects ie. in 87 (87%) subjects, followed by sedentary lifestyle in 65 (65%), hypertension 56 (56%), obesity 44 (44%), Diabetes 32 (32%), raised uric acid level 12 (12%). Not a single subject was smoker. *(Table 5)*

Table 1 - **Distribution of subjects according to Type of Dyslipidemia**

Type of lipids	No. of Cases (%)
TC>200	25 (25)
LDL>130	32 (32)
HDL<50	89 (89)
TG>150	33 (33)
TC>200+TG>150	18 (18)

(Mean TC 178.4 mgs & SD 56.1, Mean LDL 106.7 mgs & SD 49.5, Mean HDL 41.4 mg & SD 12.8, Mean TG 145 mg & SD 82.5)

Table 2 - **Distribution of Subjects according to CIMT Values**

CIMT in mm	No. of cases (%)
<0.9 mm	87 (87)
>0.9 mm	13 (13)

(Mean Rt CIMT 0.81 & SD 0.84, Mean Lt CIMT 0.71 & SD 0.16)

Table 3 - **Correlation between lipid profile (LP) and CIMT**

Lipid Profile	Normal CIMT	Increased CIMT (%)
Normal (n=13)	13 (100)	0 (0)
Abnormal (n=87)	74 (85)	13 (14.94)

(Sensitivity of LP as a marker for abnormal CIMT 100% with p value<0.001%, specificity low, only 14.9%)

Table 4 - **Showing correlation between Life style diseases , lipid profile and CIMT**

Disease	Abnormal LP	Abnormal CIMT	P value
Obesity (BMI >25)n=44	42 (95.5%)	5 (11.3%)	0.46-NS
DM (n=32)	29 (90.6%)	4 (12.5%)	0.88-NS
HT (n=56)	48 (85.7%)	0 (0%)	0.007-S
CAD (n=14)	11 (78.5%)	0 (0%)	0.199-NS
CVD (n=4)	4 (100%)	1 (25%)	0.64-NS

(NS=not significant, S=significant)

Table 5 - **Showing prevalence of CAD risk factors in the study population (n=100)**

Risk factor	No. of cases (%)
Dyslipidemia	87 (87)
Sedentary lifestyle	65 (65)
Hypertension	56 (56)
Obesity	44 (44)
Diabetes	32 (32)
Uric acid	12 (12)
Smoking	0 (0)

Discussion -

The present study conducted in 100 postmenopausal rural women, showed high incidence of dyslipidemia 87 (87%), (any one or more parameter out of TC, LDL, HDL and TG being abnormal), commonest type of abnormality observed was low HDL (89%). Results of the comparative study conducted on urban and rural women in United states for cardiovascular (CV) risk factors revealed lower levels of HDL in rural women than urban women[9]. Concept of low HDL as a major CAD risk factor emerged from the Framingham heart study. It is speculated that HDL-C attenuates the atherogenicity of LDL-C3. In a Taiwanese study carried out in 2006, the prevalence of metabolic syndrome was significantly higher in postmenopausal women than in premenopausal women but low HDL-C was found to be more prevalent in premenopausal women.[10] Similar observations were made in a Chinese study where it was concluded that age, menopause and central obesity were all independent and significant cardiovascular risk factors in Chinese women.[11]

results of the present study are comparable to others but the evaluation of dyslipidemia was done only in rural population, urban population was not studied.

Increased prevalence of traditional risk factors of CAD (DM, Hypertension, Dyslipidemia, Increased waist circumference) in postmenopausal women has been reported previously.

The results of the population based study conducted on women from Bangaladesh, showed prevalence of high blood pressure, elevated fasting blood glucose and high triglyceride significantly higher in post menopausal women than premenopausal women, however prevalence of low HDL-C was significantly lower in postmenopausal than premenopausal women.[12]

The present study did not compare pre and post menopausal women incidence of low HDL-C in our study population was highest as compared to the other abnormalities of lipid profile. This is just the observational findings & whether related to environmental or lifestyle factors in rural areas is unexplainable.

Reported prevalence of Metabolic syndrome[13] in postmenopausal women of rural canton in China was 37.1% Similar type of results were also reported by Tandon V R et a l(Jammu & Kashmir) in 201014. This study was carried out in five hundred postmenopausal women from rural health centres & showed alarmingly high prevalence of most of the conventional CV risk factors, especially diabetes in 21%, hypertension in 56%, BMI>25 in 78%, waist circumference>88cm in 60%, dyslipidemia in 39%, raised uric acid in 4%, smoking in 0.5 %. Lifestyle was sedentary in 55% of postmenopausal women. Results of our study were comparable to the above study except dyslipidemia & sedentary life style prevalence was more (87% & 65%). Prevalence of increased waist circumference (19%) was also less in the present study. .

Another Indian study carried out by P. Kempegowda et al[15] in 2011 showed prevalence of obesity in 37%, diabetes in 41%, hypertriglyceridemia in 38%, low HDL-c in 93%, hypertension in 76% and metabolic syndrome in 42% rural women (not all

postmenopausal) in Karnataka. These results were comparable with our results (44%, 32%, 33%, 89%, 56% respectively)[16].

Increase in the thickness of intima and media of carotid artery, as measured non invasively by ultrasonography, is directly associated with an increased risk of myocardial infarction and stroke in older adults without a history of cardiovascular disease.16In our study increased CIMT was very closely related to abnormal lipid profile but its correlation with obesity, diabetes, hypertension, CAD and CVA was not found to be significant.

It has been shown that over past 50 years, prevalence of obesity, hypertension, dyslipidemia and diabetes has increased considerably in urban India and slowly rural Indian population is also catching up.[16] Changes in dietary pattern, reduced physical activity due to modernisation in all fields, increased mental stress may be some of the factors responsible for increasing incidence of lifestyle diseases in rural areas. Interestingly most of our study population (85%) used soyabeen oil as the cooking media, probably it is the cheapest and readily available edible oil in this part of Maharashtra. Soyabeen oil is a PUFA oil with good n3:n6 ratio. Approximate quantity used per person per month was 1 liter, which is quite acceptable.

Conclusion -

Present study showed high prevalence of dyslipidemia (87%) in postmenopausal rural women coming to a tertiary care hospital in Nagpur, Maharashtra. Prevalence of raised CIMT was low (13%). All women having raised CIMT had dyslipidemia but vice versa was not true, indicating high sensitivity but low specificity of abnormal lipid profile for raised carotid intima media thickness.

Prevalence of other CAD risk factors was variable in the study population but comparable to other Indian population based studies.

Limitations of the study : The present study was carried out only in postmenopausal women in rural area. Women from Urban areas should have been included as a control so better comparative results would have obtained.

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