

A Comparative Study of Lipid Profile in Pre and Postmenopausal Women

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Abstract

Introduction: The risk of coronary artery disease increases in women after menopause. This increased risk may be associated with alterations in the lipid profile characterized by changes in low density lipoprotein particle size. This has been attributed in part to adverse changes in plasma lipids and lipoprotein levels due to reduced estrogen levels. Deposition of fatty plaques on arterial walls (arteriosclerosis) is a predisposing factor for CHD. Our previous study was aimed at comparing lipid profile between premenopausal and postmenopausal women done in 2013-14 with sample size of 100 pre- and post menopausal women. So, we did the same study with increase sample size by 10 times (1000 samples) to rule out the effect of small sample size on previous results and find out the difference in lipid profile between pre-and postmenopausal women.

Material & Method: The study was conducted in dept. of Biochemistry, GMC, Kota. The present study comprised of 1000 subjects, out of which 500 were premenopausal and 500 postmenopausal women. Samples were analyzed for lipid profile on autoanalyzer Transasia EM 360. Data was collected from the period of June 2013 to May 2014 and analyzed in 2021-22.

Result: data was summarized in the form of MEAN \pm SD and differences in means of both the groups was analyzed using student 't' test. Observations shows significant difference in Lipid profile parameters between pre- and postmenopausal women.

Conclusion: Study concluded that there is significant alteration in lipoprotein levels after menopause. So, postmenopausal women should be shifted in diet changes and if needed then lipid lowering drugs should be added to decrease the cardiovascular disease.

Keywords: Cardiovascular Disease, HDL, LDL, TG, VLDL, TG, Menopause.

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Introduction

Menopause is a natural event in the ageing process of women. It is heralded by

menopausal transition, a period when the endocrine, biological and clinical features

of approaching menopause begins[1]. The average age of menopause is 51 years. Apart from being a natural process, menopause could also be induced by surgery by removal of the ovaries, chemotherapy or high dose radiotherapy related to cancer treatment and premature occurrence due to ovarian failure[2].

The criteria published in the 'Report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in adults' (1988), the prevalence of hypercholesterolaemia was calculated in the studied females and it was found that 18/100 (18 %) of the total females were hypercholesterolemic, these all were postmenopausal candidates.

The hormonal changes associated with menopause e.g. low plasma levels of estrogen and marked increase in leutenizing and follicle stimulating hormone levels exerts a significant effect on the metabolism of plasma lipids and lipoproteins[3]. Atherogenic alterations in lipid and lipoprotein profiles have been found in studies of surgically induced menopause[4,5,6] and epidemiological studies comparing premenopausal women with menopausal and postmenopausal women[7,8].

The risk of coronary artery disease increases in women after menopause. This increased risk may be associated with alterations in the lipid profile characterized by changes in low density lipoprotein particle size and buoyancy[9]. The incidence of coronary heart disease has been observed to be increased in postmenopausal women until they become similar to the corresponding rates in men of similar age[10].

This has been attributed in part to adverse changes in plasma lipids and lipoprotein levels due to reduced estrogen levels[11]. Deposition of fatty plaques on arterial walls

(arteriosclerosis) is a predisposing factor for CHD[12].

The effect of the hormonal changes associated with menopause on the serum lipid levels play important role in most cardiac related disorders associated with menopause[13].

Our previous study was aimed at comparing the serum level of total cholesterol, triglycerides, high density lipoprotein (HDL), low density lipoprotein (LDL) and very low-density lipoprotein (VLDL) between premenopausal and postmenopausal women done in 2013-14 with sample size of 100 pre- and post menopausal women in GMC, kota.

As cardiac diseases are very common in post menopausal female. So, we reconsider the same research with increase sample size by 10 time (1000 samples) to nullify the effect of small sample size on previous results. Therefore, this study was planned to compare the differences of the serum lipid profile in premenopausal and postmenopausal women and study the effect of menopause on lipid profile.

Material & Method:

The study was conducted in the Dept. of Biochemistry, Govt. Medical College and Hospital, Kota. Data was collected from the period of June 2013 to May 2014 and analyzed in 2021-22.

The present study comprised of 1000 subjects, out of which 500 were premenopausal and 500 postmenopausal women. The subjects were selected amongst those attending the Department of Obs & gynae, NMCH, MBS Hospital Kota, Rajasthan, India in age between 20 to 70 years. Patients having diabetes, thyroid problems, pregnancy and having malignancy are excluded from the study. serum was separated following standard protocol and lipid profile estimation was done on Fully Autochemistry analyzer Transasia EM 360.

Ethics statement: The study protocol was approved by the institutional ethical committee. Informed consents were obtained in written-form from patients and all clinical investigations were conducted according to the standard protocol. The patients gave consent for the publication of the clinical details.

Data Analysis: Data was recorded as per Performa. The data analysis was computer based; SPSS-22 was used for analysis. For

categorical variables chi-square test was used. For continuous variables independent samples' *t*-test was used. *p*-value <0.05 was considered as significant.

Result and discussion:

This section presents the demographic data and the results obtained for cholesterol, triglycerides, HDL-C, LDL-C and VLDL-C in the females grouped according to pre- and postmenopausal states.

Table 1: Cut-off lipid values for classification of hyperlipidaemias

Parameters	Desirable	Borderline High Risk	High Risk CHD
Cholesterol: (mg/dl) (mmol/l)	< 200 (5.18)	200-239 (5.18 - 6.19)	> 240 (6.22)
LDL-Cholesterol: (mg/dl) (mmol/l)	< 130 (3.37)	130-159 (3.37 - 4.12)	> 160 (4.14)
HDL-Cholesterol: (mg/dl) (mmol/l)	> 40 (1.04)	35-40 (0.91 - 1.04)	< 35 (0.91)
Triglycerides: (mg/dl) (mmol/l)	< 250 (2.83)	250-500 (2.83-5.65)	> 500 (5.65)

Table 2: Serum lipid profile of premenopausal and postmenopausal women

Subjects	TC	HDL-C	TG	LDL	VLDL
Premenopausal n = 500	155.52±40.2 8	54.34±22.1 2	102.32.±11.4 8	84.35±25.12	20.46±2.2 8
Postmenopausal n = 500	212±30.37	27.53±16.7 2	125.68±10.54	158.28±32.3 5	25.14±2.1 1
p-value	p<0.05	p<0.05	p<0.05	p<0.05	p<0.05

To summarize our results, the TG and VLDL-C levels and LDL-C were significantly higher ($p < 0.05$) and HDL-C lower in postmenopausal women than in premenopausal women of both groups [14,15,16].

Cholesterol was found to correlate positively with LDL-C. This was expected, since LDL-C is the major carrier of cholesterol in the blood. Interestingly this correlation existed within each group.

Decrease in HDL-C and increase in cholesterol and LDL-C are all risk factors for the development of cardiovascular disease. Hence overweight and obesity can

be considered as major risk factors for cardiovascular diseases.

It is well documented that elevated plasma HDL-C level is protective against coronary heart disease whereas decreased levels increase the risk of coronary heart disease. Considering the normal level of HDL-C to be >40mg/dl, we calculated the prevalence of females with values lower than the cut-off level and find HDL-C in premenopausal women 54.34±22.12 and 27.53±16.72 in postmenopausal women. The difference between two groups was statistically significant.

The human adipose cells are shown to specifically bind HDL-C and this binding is

related to fat cell size. In individuals with abdominal obesity, there may be a disproportionate uptake of HDL-C contributing to the reduction in plasma HDL-C levels[17].

LDL-cholesterol is the major carrier of cholesterol in the blood, from the liver to the tissues. It is considered as the 'bad' cholesterol and elevated level is associated with increasing risk of CHD. In the pre- and post-menopausal females, the range was 84.35 ± 25.12 mg/dl and 158.28 ± 32.35 mg/dl, respectively and the difference between the two groups was statistically significant.

In several studies including our study safe LDL-C are considered as < 130 mg/dl and values above this are considered as a high-risk value. A highly significant positive correlation was seen between LDL-C and cholesterol, triglycerides, while a negatively correlation was obtained with HDL. Several studies have shown that the androgenic obesity is much greater risk factor compared to the pear shape obesity, as there appear to be a higher chance of metabolic abnormalities[18].

Conclusion:

This study showed that hormonal changes associated with menopause alters the lipid profile in women as evidenced by higher total cholesterol (TC), low-density lipoproteins cholesterol (LDL-C), and lower high-density lipoprotein (HDL-C) seen in factors for coronary heart disease across the postmenopausal women. In addition to previous results, TG and VLDL are also increased. The higher TC-C, LDL-C, TG and VLDL and lower HDL- C and atherogenic index in postmenopausal women is one of the proven risk factors for coronary artery disease. So, we conclude that postmenopausal women should be shifted on diet change and also should be prescribed lipid lowering drugs, if needed.

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