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Original Research Article

# Study of Lipid Profile In Healthy Pre-Menopausal And Post Menopausal Subjects

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**Abstract:**

Menopause is a phase of woman's natural aging process and is marked by the cessation of ovarian function. Menopause is a normal life transition in a woman's life when reproductive capacity is lost due to loss of ovarian function resulting in a decrease in circulating oestrogen levels Menopause is an oestrogen deficient state. The increased incidence of cardiovascular risk in the post-menopausal women may partly be due to hormonal changes leading to derangement of lipid metabolism. The present study is aimed to evaluate the variation in lipid profile in pre- and post-menopausal women. 40 Premenopausal & 40 Postmenopausal women were enrolled in the study after obtaining consent from each patient. Lipid profile was done & compared between both the groups. It was found in study that there is increase in serum Total Cholesterol (TC), Triglycerides (TG), LDL-cholesterol and VLDL-cholesterol level in post-menopausal women as compared to those in pre-menopausal women ($p<0.001$). HDL-cholesterol level was significantly decreased in post-menopausal women as compared to that in pre-menopausal women ($p<0.001$). Predicting the factors affecting the lipid profile in post-menopausal women, adopting strategies to control these mechanisms by modifying the relative risk factors during menopausal transition may improve the cardiovascular risk profile in these women.

**Keywords:** Lipid Profile, Premenopausal, Post-Menopausal Women.



## Introduction

Menopause is a normal life transition in a woman's life when reproductive capacity is lost due to loss of ovarian function resulting in a decrease in circulating oestrogen levels Menopause is an oestrogen deficient state characterized by permanent amenorrhoea lasting for a period of 1 year due to the cessation of ovarian functions.[1] There is considerable variation in the level of estrogen in postmenopausal women occurs during the early postmenopausal years because of continued secretion of estradiol from the ovary and conversion of androstenedione to estrone in fat tissue. [2] In young women, where oestrogen production is high, serum lipids are normal but after menopause, lipid levels are increased resulting in increased incidence of coronary heart diseases. This shows the possible relationship among oestrogen, normal lipid profile and atherosclerosis and the relative immunity to coronary artery diseases (CAD).[3] Natural menopause confers a 3-fold increase in CAD risk and postmenopausal women account for > 30% of the female population at risk for CAD in India.

[4-6]. Hormonal changes after menopause such as low plasma estrogen level and elevated Luteinizing Hormone (LH) and Follicle Stimulating Hormone (FSH) level have significant effect on plasma lipid and lipoprotein metabolism resulting in ultimate cardiac related disorders.[7,8]

Estrogen shows cardio protective effect by maintaining high level of HDL-C and low level of LDL-C and TAG. Mass clearance of LDL-C from the plasma results probably from accelerated conversion of hepatic cholesterol to bile acids and increased expression of LDL receptors on cell surfaces. Increase in production of apolipoprotein A-I and decrease in hepatic lipase activity facilitate increase of HDLC.[9] Coronary artery disease (CAD) is the leading cause of death among the post-menopausal women. Postmenopausal women are 4-8 times more likely to die of CAD than of any other disease.[10] The occurrence of cardiovascular disease after menopause may be partly caused by changes in the plasma lipid levels following the

menopausal transition. [11-13] Therefore this study was aimed to evaluate the variability of lipid profile in pre-menopausal and post-menopausal women

## Material and Methods

The present study was undertaken in the department of Medicine, in tertiary care institute.

**Study Design:** Study groups includes:

Group-1: 40 premenopausal women [Age between 27 to 49 years].

Group-2: 40 postmenopausal women[Age between 50 to 70 years ].

**Inclusion Criteria:** Suitable subjects who accept to take part in this research, Subjects with no history of any chronic disorder, Premenopausal women with a history of regular menstrual cycle.

**Exclusion Criteria**

- Pregnant women.
- Patients on drugs for abnormal lipids or hormone therapy.
- Patients with history of hysterectomy, oophorectomy.
- Patients with cardiovascular disease, diabetes mellitus, hypertension, obesity, or metabolic diseases.

All the subjects included in the study were included in the study after getting informed consent. Each patient underwent detailed clinical history, physical examination and investigations. In this study, we measured serum levels of lipid profile comprising of Total Cholesterol (TC), Triglyceride (TG), High Density Lipoprotein Cholesterol,(HDL-C), Low Density Lipoprotein Cholesterol (LDL-C) and Very Low Density Lipoprotein Cholesterol (VLDL-C). Estimation of plasma HDL level was done using Immune Precipitation Method, Total Cholesterol and Triglyceride using enzymatic method, VLDL Cholesterol & LDL Cholesterol was calculated using the Friedewald Equation. The detailed history and anthropometric measurements were recorded. Weight, Height, was measured from each subject and BMI was calculated by using formula wt in kg/(ht in m)$^2$.

**Data Analysis**

All values were expressed as mean ± Standard Deviation. Comparison of mean was done by independent samples t-test. The statistical analysis was performed using SPSS 21 version. Statistical significance was considered at $p < 0.05$ and $p<0.001$ as highly significant.

## Results

**Table 1: General features of study population**

| Parameters | Pre-menopausal subjects N =40 | Post menopausal subjects N = 40 |
|---|---|---|
| Age[years] | 38.34 ± 5.91 | 58.44 ± 6.23 |
| Weight [Kg] | 54.45± 6.10 | 60.72 ± 5.82 |
| Height [cm] | 148 .62 ± 5.27 | 145.82 ± 4.42 |
| BMI | 25.64 ± 2.98 | 27.38 ± 2.28 |

**Table 2: Lipid profile (mg/dl) in pre-menopausal and post-menopausal women**

| Parameters | Pre-menopausal N=40 | Post menopausal N =40 | P value |
|---|---|---|---|
| Total Cholesterol | 139 ± 11.38 | 208 ± 21.37 | < 0.001 |
| TG | 107.04 ± 7.32 | 122 ± 8.87 | <0.001 |
| HDL-C | 45.20 ± 4.48 | 31 ± 3.87 | <0.001 |
| LDL -C | 84.40 ± 20.22 | 135 ± 22.24 | <0.001 |
| VLDL -C | 20.42 ±2.27 | 35.22 ± 5.24 | <0.001 |

Table 2 shows significant increase in serum Total Cholesterol (TC), Triglycerides (TG), LDL-cholesterol and VLDL-cholesterol level in post-menopausal women as compared to those in pre-menopausal women ($p<0.001$). HDL-cholesterol level was highly significantly decreased in post-menopausal women as compared to that in pre-menopausal women ($p<0.001$).

## Discussion

In the present study, we observed that the various parameters of lipid profile were healthier in premenopausal women as compared to post-menopausal women. This has been suggested that increased lipid profile in post-menopause occurs due to elevated oestrogen levels after post menopause. The results were statistically significant. Table 2 depicts the comparison of plasma lipid levels in premenopausal and post-menopausal women. It was observed that TC, TGL, VLDL and LDL were significantly elevated in post-menopausal women as compared to pre-menopausal women. Similarly, the HDL level in premenopausal level was higher as compared to post-menopausal women. The results were observed to be statistically significant. This suggests that the lipid profile of post-menopausal women is more on the unhealthy side as compared

to pre-menopausal women. N Wang et al compared serum lipid values in premenopausal and postmenopausal women and to evaluate the relationship between menopause and lipid profiles.[17] They concluded that prevalence of dyslipidemia is higher in post-menopausal women than in pre-menopausal women, and the values of TC, TG, LDL-C, non-HDL-C, TC/HDL-C ratio of postmenopausal women are significantly higher than those of premenopausal women. Menopause is associated with dyslipidemia in this cohort. Menopause is a natural event in the ageing process of a woman and signifies the end of reproductive years with cessation of cyclic ovarian functions as manifested by cyclic menstruation. While premenopausal women have a lower incidence of cardiovascular diseases (CVD) compared with men of the same age, the incidence of the disease in women increases dreadfully after the age of 50 years.[14] The antiatherogenic effect of estrogens and the protection of females against CVD, especially coronary heart disease are well described during the premenopausal period.[15] Indeed, there is convincing evidence that menopause is associated with a pro-atherogenic lipid profile characterised by low HDL, higher LDL and TGs levels.[16] Menopause denotes a condition of permanent cessation of menstruation at the end of reproductive life due to loss of ovarian follicular activity and cessation of menstruation. Menopause is also associated with decreased physical activity which leads to altered lipid profile. During exercise free fatty acids are required for energy production which is in turn produced by metabolism of triglycerides in the adipose tissues. The triglycerides are hydrolysed to free fatty acids and glycerol by lipoprotein lipase enzyme. Adrenal cortex and gonadal hormones are also responsible for degradation of lipids.[19] As gonadal activity is also less in post-menopausal period. adverse changes in glucose and insulin metabolism, body fat distribution, coagulation, fibrinolysis and vascular endothelial dysfunction[18].There are various hormonal adverse changes in glucose and insulin metabolism, body fat distribution, coagulation, fibrinolysis and vascular endothelial dysfunction. Lack of estrogen is an essential contributory factor in the derangement of lipid metabolism in postmenopausal women which is associated with increased cardiovascular risk.[20] Currently, post-menopausal women account for more than 30% of the female population at risk for CAD in India.[21]

## Conclusion

From our study it is evident that the mean values of total Cholesterol, LDL were higher and HDL was lower in post-menopausal women due to estrogen deficiency when compared with pre-menopausal women. This may lead to the development of atherosclerosis in postmenopausal women, thus increasing the risk for cardiovascular disease. As abnormal lipid profile is independent risk factor for CVD, post-menopausal women are considered to undergo screening for lipid profile.

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