

Comparative assessment of serum lipid profile levels between premenopausal and postmenopausal healthy woman- A case control study

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Abstract

Background: A comparative study of lipid profile levels between premenopausal and postmenopausal woman. **Aims:** There is an increased incidence of cardiovascular risk in Post-menopausal woman due to hormonal changes causing changes in the serum lipid levels. The objective is to compare serum lipid profile levels between premenopausal women and postmenopausal women, as Cardiac diseases are common in post-menopausal women. **Method:** A total of 100 healthy subjects who comprised 50 premenopausal woman aged between 20-45 years and 50 post-menopausal woman aged between 46-65 years were selected. Ethical clearance was obtained from institutional Ethical committee and informed consent of each participant was obtained before start of the study. Blood samples were collected for the measurement of lipid profile levels. Student's unpaired T test was used for the statistical analysis. P values of < 0.05 were considered to be statistically significant. **Results:** The mean of serum total cholesterol was 187.54 mg/dl in test group and 171.98 mg/dl in control group with p value of <0.01. The mean of serum triglycerides was 160.36 mg/dl in test group and 117.7 mg/dl in control group with p value of <0.0001. The mean of serum LDL-C was 118.3mg/dl mg/dl in test group and 103.54 mg/dl in control group with p value of <0.003. The mean of serum VLDL-C was 118.3mg/dl in test group and 103.54 mg/dl in control group with p value of <1.48. The mean of serum HDL-C was 37.1mg/dl in test group and 42.14 mg/dl in control group with p value of <0.0001. **Conclusions:** This study concluded that serum level of HDL-C are significantly lower and serum TC, TG, LDL-C are significantly higher in post-menopausal woman compared to pre-menopausal woman.

Key Words: Post-menopausal woman, Cardiovascular Diseases, Dyslipidemia,

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INTRODUCTION

Menopause is a permanent physiological state with cessation of menstruation attributable to the loss of ovarian

function and reduction in the production of estrogen.¹ The average age of menopause is reported to be 51 years² but the age of natural menopause may vary from 40 to 58 years. This phase is characterized by variety of changes in socio-cultural, physiological and psychological states. These changes culminate into myriad of symptoms including insomnia, sweating, hot flashes, depressive mood, vaginal dryness and general discomfort.³ Cardio protective effect on premenopausal women is believed to be imposed by adequacy of endogenous estrogen level produced during menstrual cycle. This could be the possible reason for declined rate of coronary heart disease in fertile women than men [4]. However, by the end of reproductive life ovaries fail to produce significant amount of estrogen instigating postmenopausal women more prone

to disease associated with estrogen deficiency like heart diseases, osteoporosis, and dyslipidemia.^{5,6} 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 HDL-C.⁹ Coronary artery disease (CAD) is the leading cause of death among the post-menopausal women. Post-menopausal 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] Low-density lipoprotein has been involved in the development of Coronary Heart Diseases (CHD). Deposition of fatty plaques on arterial walls (arteriosclerosis) is a predisposing factor for CHD¹⁴ Since estrogen plays decisive role in lipid and lipoprotein metabolism, it is indispensable to monitor lipid profile in postmenopausal women who tend to have diminished estrogen level. Hence, the present study was undertaken to compare serum level of TC, TG, HDL-C, and LDL-C in pre and post menopausal women.

MATERIALS AND METHODS

Study site: This study was done at Viswabharathi Medical College and General Hospital from June-2019 to July 2019.

Type of study: cross sectional study

Study population: 100 healthy female attendants who comprised 50 Premenopausal women, aged between 20-45 years and 50 post-menopausal women aged women between 46-70 years with a history of natural menopause, and stoppage of menstruation for a minimum of one year accompanying with the patients attending OPD of General Medicine and OBG department of Viswabharathi Medical College and General Hospital were randomly selected for the study.

Exclusion criteria: The subjects having risk factors that may affect the lipid profile such as, Diabetes mellitus, intake of lipid lowering drugs, hypertension, pregnancy, smokers, alcoholics, obesity, hysterectomy.

Ethical clearance: ethical clearance was obtained from the Institution ethical Committee, and informed consent form was obtained from the subjects.

Collection of samples: 5ml of 12 hours over night fasting blood sample was drawn from premenopausal woman (control) and postmenopausal woman (Case) in sitting position at an angle of 45° from median cubital vein, later placed in a clean, dry test tube allowed to clot adequately and centrifuged at 3,000 rpm for 3 min. Serum was collected and analyzed immediately for estimation of total cholesterol, HDL-C, LDL-C, VLDL-C and triglycerides. Total cholesterol (TC) was measured using established enzymatic methods of Allain *et al.*¹⁵

TG was isolated enzymatically by glycerol-3-phosphate oxidase - phenol + aminophenazone method as described by Schettler *et al.*¹⁶

HDL-C direct was isolated by enzyme selective protection method of Williams *et al.*¹⁷

LDL was calculated using the Friedewald formula: $LDL-C = TC - (HDL-C + TG/5)$.

Very LDL-C (VLDL) was calculated using the formula: $VLDL-C = TG/5$ ^[18]

Analysis was done on fully auto analyzer XL 640.

Statistical analysis: All data obtained from the estimation were reported as the mean ± standard deviation (SD) and student unpaired t-test was used for comparing mean ± SD between the groups. The p value (p < 0.05) is considered as significant.

RESULTS

The average age for pre-menopausal women was 33.66 ± 7.89 years and that for post-menopausal women was 55.88 ± 6.72 years. The mean level of lipid profile were assessed in premenopausal and post-menopausal women. The results of the present study showed that the mean of serum total cholesterol was 187.54 mg/dl in test group and 171.98 mg/dl in control group with p value of <0.014 which is statistically significant. The mean of serum triglycerides was 160.36 mg/dl in test group and 117.7 mg/dl in control group with p value of <0.0001 which is statistically significant. The mean of serum LDL-C was 118.3 mg/dl in test group and 103.54 mg/dl in control group with p value of <0.003 which is statistically significant. The mean of serum VLDL-C was 35.88 mg/dl in test group and 21.37 mg/dl in control group with p value of <1.48 which is not significant statistically. The mean of serum HDL-C was 37.1 mg/dl in test group and 42.14 mg/dl in control group with p value of <0.0001 which is significant statistically.

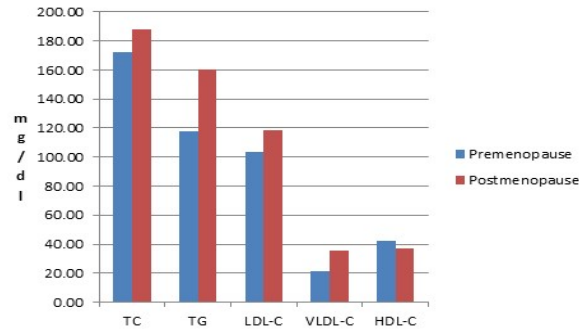


Figure 1: Serum lipid profile among premenopause and post menopause women

TABLE 1:

Lipid profile	Controls (Premenopausal women)MEAN±S.D	Cases (Post Menopausal Women)MEAN±S.D	P VALUE
Total Cholesterol (mg/dl)	171.98±26.59	187.54±35.18	0.014*
Triglycerides (mg/dl)	117.7±37.35	160.36±79.08	0.0001*
HDL (mg/dl)	42.14±7.27	37.1±4.82	0.0001*
LDL (mg/dl)	103.54±20.37	118.3±28.35	0.003*
VLDL (mg/dl)	21.37±7.22	35.88±15.27	1.48

* P Value <0.05 is considered Statistically significant

DISCUSSION

In the present study, there was a statistically significant increase in the mean levels of serum total cholesterol (TC), Triglycerides (TG) and low density lipoprotein cholesterol (LDL cholesterol) and statistically significant decrease in the mean levels of serum high density lipoprotein cholesterol (HDL cholesterol) in post menopausal women compared with the premenopausal women. This correlates with previous studies by Usoro *et al.*¹⁹ who found statistically significant increase in levels of serum total cholesterol LDL cholesterol and triglycerides, statistically significant decrease in the mean value of HDL cholesterol after menopause and that of Igweh *et al.*²⁰ that observed statistically significant increase in levels of serum LDL cholesterol and statistically significant decrease in the mean value of HDL cholesterol after menopause and that of Mathew *et al.*²¹ observed significant increase in levels of serum total cholesterol, LDL cholesterol and triglycerides after menopause Oestrogens have several cardio-protective mechanisms that change the vascular tone by increasing nitrous oxide production. Oestrogens stabilize the endothelial cells, they enhance antioxidant effects and alter fibrinolytic protein. All these are cardio protective mechanisms which get lost with the onset of menopause.²²⁻²³ It has been proposed that estrogen exerts cardio protective action among pre-menopausal women by maintaining high level of high-density lipoprotein cholesterol (HDL-C) and lowering the low-density lipoprotein cholesterol (LDL-C), and triglycerides (TG).²⁴⁻²⁷ Lack of estrogen is an essential contributory factor in the derangement of lipid metabolism in postmenopausal women which is associated with increased cardiovascular

risk.²⁸ Currently, post-menopausal women account for more than 30% of the female population at risk for CAD in India.²⁹

CONCLUSION

In our study Total Cholesterol, Triglycerides, LDL-C were increased and HDL-C was decreased in postmenopausal women compared to premenopausal 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, postmenopausal women are considered to undergo screening for lipid profile.

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