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Study of Variation in Lipid Profile Parameters in 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. 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. 50 Premenopausal & 50 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 ($p<0.001$). Post-menopausal women are at increased risk of developing cardiovascular disease due to change in the lipid pattern and loss of cardioprotective effect of estrogen. 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: *Serum 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 characterised 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, 5]. Hypercholesterolemia is a key factor in the pathophysiology of artherosclerosis [6]. A decreased level of oestrogen and increased level in LH and FSH levels in perimenopause exerts a significant effect on plasma lipids and lipoproteins. Oestrogen has a protective effect against cardiovascular system as oestrogen lowers the LDL-cholesterol by acting on LDL-receptors. Apart from maintaining friendly lipid profile, estrogen changes the vascular tone by increasing nitrous oxide production. It stabilizes the endothelial cells, enhances antioxidant effects and alters fibrinolytic protein [7]. All these are cardioprotective mechanisms, which are lost in menopause. Currently, post-menopausal women account for more than 30% of the female population at

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risk for Coronary Artery Disease [8]. Therefore this study was aimed to evaluate the variability of lipid profile in pre menopausal and post menopausal women.

Material and Method

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

Study Design

Study groups includes

Group-1: Fifty premenopausal women [Age between 30 to 45 years]

Group-2: Fifty postmenopausal women [Age between 46 to 65 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[9].

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 $P < 0.05$.

Results

Table 1: General features of study population

Parameters	Pre menopausal subjects Age [30-45 years] N =50	Post menopausal subjects Age [46-65 years] N = 50
Age [years]	40.34 ± 3.91	57.44 ± 6.23
Weight [Kg]	54.45 ± 6.10	53.72 ± 5.82
Height [cm]	147.62 ± 4.24	146.82 ± 3.40
BMI	24.24 ± 1.98	26.38 ± 2.40

The mean age of pre menopausal and post menopausal women of the present study was 40.34 ± 3.91 years and 57.44 ± 6.23 years respectively (Tab 1).

Table 2: Lipid profile (mg/dl) in pre menopausal and post menopausal women. Comparison olasma lipids in Premenopausal an

Parameters	Pre menopausal N=50	Post menopausal N =50	P value
Total Cholesterol	149 ± 14.34	210± 24.47	< 0.001
TG	104.04 ± 6.20	120 ± 10.47	<0.001
HDL-C	48.20 ± 6.48	29.6 ± 6.10	<0.001
LDL-C	84.40 ± 20.22	140 ± 26.24	<0.001
VLDL-C	20.42 ±1.26	26.22 ± 2.24	<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 significantly decreased in post-menopausal women as compared to that in pre-menopausal women ($p<0.001$).

Discussion

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. The anti-atherogenic effect of estrogens and the protection of females against CVD, especially coronary heart disease are well described during the premenopausal period. Indeed, there is convincing evidence that menopause is associated with a pro-atherogenic lipid profile characterised by low HDL, higher LDL and TGs levels[10]. The present study shows that there are variations of the lipid profile in post menopausal women as compared to pre menopausal women. This can be explained that after menopause, there is decrease oestrogen level and other hormonal effect in the women which may result to abnormal glucose and insulin metabolism, ultimately produced abnormal effect on the lipid metabolism. The findings in our study are in accordance with other studies done by Kalavathi *et al* [11], Muzzio *et al* [12] and Matthews *et al* [13], where the TC was increased in post-menopausal women when compared to pre-menopausal women and is statistically significant ($P < 0.05$). There was significant reduction in the cardio protective HDL-C and significant increase in the atherosclerotic LDL-C in post Menopausal Women which was in consistent with the findings of Igweh *et al*[14]. The increased LDL-C and the decreased in the cardio protective HDL-C is an indication that menopause is an independent risk factor for developing cardiovascular disease in post menopausal women. Lipoprotein lipase (LPL) is regulated by circulating estrogen. LPL catalyzes the hydrolysis of VLDL-C to form intermediate-density lipoprotein and later LDL-C. Estrogen deficiency after menopause increases the plasma LPL and hepatic lipase activity causing plasma LDL-C to accumulate and also leads to down-regulation of LDL receptors. Menopause leads to changes in lipid profile by reducing HDL, and elevating Total Cholesterol (TC), triglycerides (TG), LDL-cholesterol and VLDL-cholesterol, thus increasing the risk for cardiovascular disease. The results of this study were in agreement with those of earlier studies, which suggested that changes in lipid profile were caused by reduced oestrogen concentrations which were seen in menopause.

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. Dyslipidemia occurs due to multifactorial reasons like physical activity, life style, diet, smoking, alcohol consumption, ethnicity and genetic makeup. So further extensive studies with importance to the duration following menopause need to be done to understand the underlying mechanisms. Hence, as the changes in lipid profile correlates directly with the change of oestrogen level. It accounts for increased CAD risk in perimenopausal women compared to premenopausal women. The risk maximises in menopause in the women. The estimation of lipo-proteins like HDL and LDL serves as a more reliable tool in predicting the risk of coronary heart disease in perimenopausal and postmenopausal women. Specific evaluation, treatment and prevention strategies must be implemented to reduce the CVD burden and promote health in post menopausal women.

Ethical Clearance: Taken from institutional ethical committee

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Conflict of Interest: Nil

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