

Original Research Article

Variability of Lipid Profile in Pre and Post Menopausal WomenIohborlang Rymbai¹, Laishram Cindy², Vijita Ningombam², Tyngshainlang Sutnga³, Ningombam Sashikanta Singh², M Anita Devi⁴¹Post Graduate Student, Department of Physiology, RIMS, Imphal, Manipur, India²Medical Officer, Manipur Health Service, Manipur, India³Post Graduate Student, Department of Physiology, RIMS, Imphal, Manipur, India⁴Professor and Head, Department of Physiology, RIMS, Imphal Manipur, India***Corresponding author**

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Abstract: Menopause is a natural aging process in women's life 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 variability of lipid profile in pre- and post-menopausal women. A total of 160 women participants who attended Out Patient Department, RIMS, Imphal were included in the study. Out of which 80 were premenopausal aged 35- 45yrs and 80 were postmenopausal aged 45-60yrs. Serum Total Cholesterol (TC) was determined by enzymatic (CHOD-PAP) calorimetric method, Triglycerides (TG) by enzymatic (GPO-PAP) method, HDL-C by precipitant method and LDL -C by using Friedewald formula: $LDL-C = TC - (HDL-C + TG/5)$ and $VLDL = TG/5$. Data were analyzed by using SPSS version 21. T test was used to compare means. P value < 0.05 was considered as significant. There were significant increased in serum TC and LDL-C in the postmenopausal women ($P < 0.05$), but HDL-C was found significantly decreased in them ($P < 0.005$). However, there were no significant differences in serum TG and VLDL-C between the two study groups. The elevated serum TC, LDL-C and the reduction of cardio protective HDL-C is an indication that menopause is an independent risk factor for developing cardiovascular disease in the post menopausal women.

Keywords: Pre-Menopause, Post-Menopause, Lipid Profile, Dyslipidaemia, Cardiovascular Disease

INTRODUCTION

Menopause is a natural event in the ageing process of women's life leading to permanent cessation of menstruation due to loss of ovarian follicular activity. Many studies have shown that the incidence of cardiovascular disease increases with age in both men and women but in women the risk increases markedly after menopause and become equivalent to that of men. A number of changes that occur in the lipid profile after menopause are associated with increased cardiovascular disease risk. Hypercholesterolemia is a key factor in the pathophysiology of atherosclerosis [1]. 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 [2]. All these are cardioprotective mechanisms, which are lost in menopause. Currently, post-menopausal women account for more than 30% of the female population at risk for Coronary Artery Disease [3]. Therefore this study was aimed to evaluate the variability of lipid profile in pre menopausal and post menopausal women.

MATERIALS AND METHODS

This is a cross sectional study conducted from Feb 2016 to Dec 2016, in the department of Physiology in collaboration with department of Obstetrics & Gynecology (O&G), Regional Institute of Medical Sciences (RIMS) Imphal. A total of 160 women participants who attended O&G OPD were include in the study, after taking approval from Research Ethic Board, RIMS, Imphal. Out of which, 80 were premenopausal in the age group of 35- 45years and another 80 were postmenopausal of age group 45-60

years. Consents were obtained from each participant after thoroughly explaining about the study. 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 $m)^2$.

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

Investigations and samples

3ml of fasting venous blood was drawn from each subject in between 8-9 a.m. Serum obtained was analyzed for lipid profile in Digital Photoelectric Colorimeter by using commercially available Reagent kit. Total Cholesterol was estimated by enzymatic (CHOD-PAP) calorimetric method [4]. Triglyceride (TG) was determined by enzymatic (GPO-PAP) method [5] and HDL-C by using precipitant method of Gordon *et al* [6]. By using Friedewald formula: (i) $LDL-C = TC$

– $(HDL-C + TG/5)$ and (ii) $VLDL-C = TG/5$, Low Density Lipoprotein-C (LDL-C) and Very Low Density Lipoprotein -C (VLDL-C) were determined.

Data Analysis

All values were expressed as mean \pm 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

The mean age of pre menopausal and post menopausal women of the present study was 40.60 ± 3.83 years and 52.43 ± 5.28 years respectively (Tab 1). Table 2 and Fig 1 show the mean serum lipid profile of premenopausal and postmenopausal women. The serum TC and LDL-C levels were significantly higher ($p < 0.05$) and HDL-C was significantly lower in postmenopausal women as compared to premenopausal women. No significant difference was observed in the TG and VLDL-C levels of both groups.

Table 3 shows the HDL-C/LDL-C ratio between the two groups. HDL-C/LDL-C ratio was found to be higher in post-menopausal women than pre-menopausal women.

Table 1: General characteristic of the study population

Parameters	Pre Menopausal (n=40)	Post Menopausal (n=40)	P value
	Mean \pm SD	Mean \pm SD	
Age	40.60 ± 3.83	52.43 ± 5.28	.001
Weight	53.60 ± 5.28	54.73 ± 6.35	.190
Height	147.78 ± 5.39	146.98 ± 4.40	.064
BMI	24.43 ± 2.04	25.31 ± 2.61	.195

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

Parameters	Pre menopausal (n=40)	Post menopausal (n=40)	P value
	Mean \pm SD	Mean \pm SD	
TG	133.33 ± 34.08	164.91 ± 40.97	.233
TC	177.62 ± 42.55	188.87 ± 38.10	.001 *
HDL	45.54 ± 8.09	40.42 ± 5.86	.009 *
LDL	105.41 ± 39.69	115.45 ± 29.95	.010 *
VLDL	26.66 ± 6.81	32.98 ± 8.19	.234

* P value < 0.05

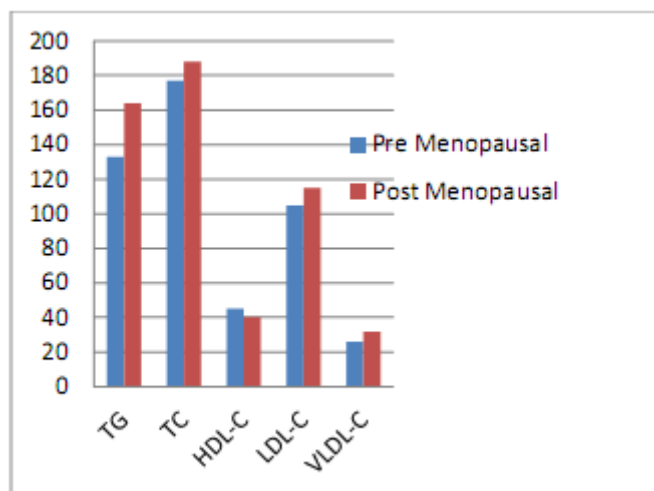


Fig-1: Comparative status of lipid profile (mg/dl) in pre and post Menopausal women

Table 3: HDL-C/LDL-C ratio in pre- and post- menopausal women

Study subjects	HDL-C	LDL-C	HDL-C : LDL-C
Pre menopausal	45.54	105.41	1: 2.31
Post menopausal	40.42	115.45	1: 2.86

DISCUSSION

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* [7], Muzzio *et al* [8] and Matthews *et al* [9], 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* [1]. 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.

In our study, the HDL-C/LDL-C ratio was increased in the post-menopausal group, and it has been shown that HDL-C/ LDL-C ratio is a significant predictor for development of atherosclerosis [10].

CONCLUSION

This study concludes that hormonal changes associated with menopause alters the lipid profile in women. Increased total cholesterol (TC), low-density lipoproteins cholesterol (LDL-C), arterogenic index (HDL-C/LDL-C ratio) and decreased high-density lipoprotein (HDL-C) was seen in the postmenopausal women, which is an indication that menopause is an independent risk factor for developing cardiovascular disease in the women.

This is a preliminary study done in Regional Institute of Medical Sciences, Imphal and further study will be needed to confirm the findings.

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