LIPID PROFILE IN PRE MENOPAUSAL AND POST MENOPAUSAL WOMENM. Padma Geethanjali¹, P. Pratima², Seetharama Raju³**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: The present study is aimed at comparing the difference of lipid profile in premenopausal and post-menopausal women and to correlate the results with other studies. The study is conducted in the Gynecology outpatient Department, King George Hospital, Visakhapatnam. It comprises of 50 Premenopausal Women and 50 Postmenopausal Women. The examination included measurement of weight, height to determine BMI, and lipid profile parameters TC, TG, HDL, LDL and VLDL are analyzed by semi-automated analyzer using enzymatic method. The "Chi square test" is used to analyze the variations in Lipid profile between Pre & Postmenopausal women. There is no significant difference in weight & BMI between Pre-menopausal and post-menopausal women, no significant difference in cholesterol and LDL but significant difference is observed in Triglycerides, HDL and VLDL. As menopause is associated with altered Serum Lipid Profile it is important to consider each and every post-menopausal woman to undergo screening for abnormal Lipid Profile.

KEYWORDS: Body mass index (BMI), Lipid Profile, TC (Total cholesterol), HDL (High density lipoproteins), VLDL (Very low density lipoproteins), LDL (Low density lipoproteins), Premenopausal and Postmenopausal Women.

INTRODUCTION: Cardiovascular disease is a leading cause of mortality in men and women in industrialized world. The interactions between the various physiological risk factors for cardiovascular disease are complex, the incidence of cardiovascular disease increase with age in both sexes, but in women the risk increases markedly after menopause and eventually becomes equivalent to that of men. This observation has suggested, but has not proven, that estrogens have a protective effect against cardiovascular disease. Menopause is a natural event in the ageing process and signifies the end of reproductive years with cessation of cyclic ovarian functions as manifested by cessation of cyclic menstruation. The hormonal changes associated with menopause i.e. low plasma levels of estrogen and marked increase in Luteinizing hormone (LH) and Follicle stimulating hormone (FSH) levels exerts a significant effect on plasma lipids and lipoproteins.

Estrogens stabilize the endothelial cells, enhance antioxidant effects and alter fibrinolytic protein. All these are cardioprotective mechanisms which get lost with the onset of menopause.¹

Menopause means permanent cessation of menstruation at the end of reproductive life due to loss of ovarian follicular activity. The effect of the hormonal changes associated with menopause on the Serum Lipid levels play an important role in most cardiac related disorders. Up to the age of 50 years, the prevalence of Coronary Artery Disease (CAD) among women is lower than among men, but the incidence rises significantly after the menopause. The incidences of Coronary Artery Disease have been observed to increase in postmenopausal women until they become equal to the corresponding rates in men of similar age. Multiple risk factors have been identified as contributory to the development of CAD.

Hypercholesterolemia is a key factor in the pathophysiology of atherosclerosis. After menopause, there is loss of ovarian function. This results in adverse changes in glucose and insulin

ORIGINAL ARTICLE

metabolism, body fat distribution, coagulation, fibrinolysis, Vascular Endothelial Dysfunction and also derangement of lipoprotein profile. Lack of estrogen is essential factor in this mechanism.

Atherogenic alterations in Lipid and Lipoprotein profiles have been found in studies of surgically induced menopause and epidemiological studies comparing premenopausal women with postmenopausal women.

METHODS: All healthy premenopausal and postmenopausal women, who attained menopause by natural means, are included in the study. Postmenopausal women who have undergone hysterectomy, diabetic, hypertensive, on hormone replacement therapy, Lipid lowering drugs & with H/O Gynecological & hormonal disorders are excluded. The study protocol is explained to the subjects, informed consent is obtained from each of the participants. The physiological parameters pulse rate & blood pressure are recorded. Height is measured on a wooden stadiometer and expressed in centimeters. Body weight (wt.) is measured using weighing scale and expressed in kilograms. The body mass index is derived by Quetelet's index from body weight (kg)/height (m²).

Both the premenopausal and postmenopausal women are further divided into four subgroups based on BMI as underweight (BMI<18.5 kg/m²), normal BMI (18.5≤BMI<24.9 kg/m²), overweight (BMI≥25 kg/m²), and obese (≥30kg/m²).

Lipid profile parameters: After overnight fasting, 2ml of venous blood sample was collected from each subject, clear unhemolyzed Serum was obtained by centrifuging blood at 300 rpm for 15 min, and Lipid profile was done by Semi-automated analyzer (Erba star 21 plus) using enzymatic method. The Lipids analyzed were Triglyceride, Total-cholesterol, HDL-cholesterol, LDL-cholesterol, VLDL-cholesterol.

Parameters	Normal Range
TOTAL CHOLESTEROL	<200mg/dl
HDL CHOLESTEROL	30-70mg/dl
LDL CHOLESTEROL	<100mg/dl
VLDL	5-30mg/dl
TRIGLYCERIDES	<150mg/dl

Table 1: The following normal Lipid Profile values are taken up for study

RESULTS: The Age, height, weight and BMI of both the groups are noted. The mean±Standard Deviation (SD) of age of subjects in premenopausal women is found to be 34.2 and in postmenopausal woman it is 53. 1. The "Chi-square test" is used to analyze the variations in Lipid profile between Pre& Postmenopausal women.

ORIGINAL ARTICLE

		Cholesterol			% Sub-Normal	Chi ²	P< value
		Total	Normal	Abnormal			
Under Weight	Pre MP	6	6	6	0.0%	0.06	NS
	Post MP	5	4	1	20.0%		
Normal Weight	Pre MP	20	19	1	5.0%	1.98	NS
	Post MP	28	14	14	50.0%		
Over weight	Pre MP	18	18	0	0.0%	0.45	NS
	Post MP	13	9	4	30.8%		
Observe	Pre MP	6	5	1	16.7%	0.95	NS
	Post MP	4	1	3	75.0%		
Overall	Pre MP	50	48	2	4.0%	3.03	NS
	Post MP	50	28	22	44.0%		

Table 2: Values of cholesterol in different Weight groups

The subnormal cholesterol levels when compared between the pre and postmenopausal Women are found to be 4% and 44% and on statistical analysis with Chi-square test it is found to be 3.03 and it is statistically not significant (NS)

		T.G.			% Sub-Normal	Chi ²	P< value
		Total	Normal	Abnormal			
Under Weight	Pre MP	6	6	0	0.0%	0.06	NS
	Post MP	5	1	4	80.0%		
Normal Weight	Pre MP	20	12	8	40.0%	1.98	NS
	Post MP	28	9	19	67.9%		
Over weight	Pre MP	18	8	10	55.6%	0.45	NS
	Post MP	13	3	10	76.9%		
Observe	Pre MP	6	4	2	33.3%	2.24	NS
	Post MP	4	0	4	100.0%		
Overall	Pre MP	50	30	20	40.0%	4.77	0.05
	Post MP	50	13	37	74.0%		

Table 3: Values of triglycerides in different weight groups

The subnormal Triglycerides levels when compared between the pre and postmenopausal women are found to be 40% and 74% and on statistical analysis with Chi-square test it is found to be 4.77 and it is statistically significant`.

ORIGINAL ARTICLE

		H.D.L			% Sub-Normal	Chi ²	P< value
		Total	Normal	Abnormal			
Under Weight	Pre MP	6	6	0	0.0%	0.06	NS
	Post MP	5	4	1	20.0%		
Normal Weight	Pre MP	20	20	0	0.0%	3.33	NS
	Post MP	28	12	16	57.1%		
Over weight	Pre MP	18	18	0	0.0%	4.49	0.05
	Post MP	13	3	10	76.9%		
Observe	Pre MP	6	6	0	0.0%	1.31	NS
	Post MP	4	1	3	75.0%		
Overall	Pre MP	50	50	0	0.0%	7.81	0.05
	Post MP	50	20	30	60.0%		

Table 4: Values of HDL In Different Weight Groups

The subnormal HDL levels when compared between the pre and postmenopausal women are found to be 0% and 60% and on statistical analysis with Chi-square test it is found to be 7.81 and it is statistically significant. It has also been seen that statistical significance in over weight group is found to be 4.49, p value > 0.05.

		L.D.L			% Sub-Normal	Chi ²	P< value
		Total	Normal	Abnormal			
Under Weight	Pre MP	6	6	0	0.0%	0.06	NS
	Post MP	5	4	1	20.0%		
Normal Weight	Pre MP	20	20	0	0.0%	0.8	NS
	Post MP	28	19	9	32.1%		
Over weight	Pre MP	18	18	0	0.0%	0.1	NS
	Post MP	13	11	2	15.4%		
Observe	Pre MP	6	5	1	16.7%	0.24	NS
	Post MP	4	2	2	50.0%		
Overall	Pre MP	50	49	1	2.0%	1.08	NS
	Post MP	50	36	14	28.0%		

Table 5: Values of LDL in different Weight groups

The subnormal LDL levels when compared between the pre and postmenopausal women are found to be 2% and 28% and on statistical analysis with Chi-square test it is found to be 1.08 and it is statistically not significant.

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		V.L.D.L			% Sub-Normal	Chi ²	P< value
		Total	Normal	Abnormal			
Under Weight	Pre MP	6	6	0	0.0%	1.87	NS
	Post MP	5	1	4	80.0%		
Normal Weight	Pre MP	20	13	7	35.0%	1.84	NS
	Post MP	28	9	19	67.9%		
Over weight	Pre MP	18	9	9	50.0%	2.00	NS
	Post MP	13	2	11	84.6%		
Observe	Pre MP	6	4	2	33.3%	2.24	NS
	Post MP	4	0	4	100.0%		
Overall	Pre MP	50	32	18	36.0%	6.44	0.05
	Post MP	50	12	30	76.0%		

Table 6: Values of VLDL in different Weight groups

The subnormal VLDL levels when compared between the pre and postmenopausal women are found to be 36% and 76% which are statistically significant.

**Fig. 1: Mean values of weight, BMI, & Lipid profile
In pre and post-menopausal women**

Sl. No.	Pre-Menopausal Group				Post-Menopausal Group			
	Age	Weight	B.M.I.	Height	Age	Weight	B.M.I.	Height
Average	34.2	55.9	24.4	151.4	53.1	50.1	22.8	148.3
SD	5.6	12.2	5.1	4.5	8.1	9.0	4.0	8.2
Coef. variation		0.22	0.21	0.03		0.18	0.18	0.06

Table 7: Mean +/- SD values in pre and post-menopausal group

ORIGINAL ARTICLE

DISCUSSION: In our study, Weight, BMI, values are within physiological limits in both the groups. There is no significant difference in weight & BMI between pre-menopausal and post-menopausal women which is similar to a study by Zafar Hussain, Sharoona M. Mahammed Akram, et al. in 2007 on three groups, G-I (Premenopausal women), G-II (Early postmenopausal women), G-III (Late postmenopausal women) which showed there is no significant difference in Total Cholesterol and LDL but significant difference in Triglycerides & HDL levels between premenopausal and post-menopausal women (218.3±53.2mg/dl) $p>0.05$.²

Quinglog wang, et al in 1994 analyzed total and regional body composition changes in 393 (age: 49-69 yrs.) early postmenopausal women. Weight is not related to age ($r=0.06>0.05$).³

There are variations of Lipid Profile levels obtained in different individuals based on race, age, obesity etc. However in our study we have tried to exclude the confounding variables and divided the study into groups depending on BMI because Lipid Profile is more dependent on BMI. In determining the cardio vascular risk the absolute values of cholesterol are not important but the concentrations of various subclasses of cholesterol are more important.

In the present study there is no significant difference in cholesterol and LDL but there is significant difference in Triglycerides, HDL and VLDL between Pre-menopausal and post-menopausal women.^{4,5}

In agreement with a study entitled "The effects of Menopause on the Serum Lipid Profile of Normal Females of South East Nigeria", by JC Igweh, et al in 2005; there is no significant difference in the serum cholesterol and triglyceride between the two groups. However there is a significant difference in HDL and increase in level of VLDL in postmenopausal women.¹

In contrast to our study there is a study entitled "Lipid profile of postmenopausal women in calabar, Nigeria". by CAO Usoro, CC Adikwuru, IN Usoro, AC Nsonwu in 2006; there is no significant difference observed in both TG & VLDL in both pre & post-menopausal women.⁴

A study entitled "Influence of menopause on high density lipoprotein, cholesterol and lipids" by Chee JK, Tae HK, Wang S.R., Un HR in 2000 showed that HDL-C was higher in post-menopausal women compared to premenopausal women and was statistically significant which is same as in our study.⁵

Our study goes partially with that of a study titled "A Comparative Study of Lipid Profile and Oestradiol in Pre-and Post-Menopausal Women", by Srinivasa Reddy Kilim and Srinivasa Rao Chandala; in 2013 who observed that there is a 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 ($p<0.001$).⁶

In a cross-sectional comparative study on 100 women 50 pre and 50 postmenopausal women 'cardiovascular disease and menopause' by Rupal, Nikita Bhatt et al in 2014 Lipid Profile abnormalities were prevalent in post-menopausal women.⁷

A study entitled "Serum Lipid Profile in prepubertal, preproductive and post-menopausal women", by Ghagya V. Hemlatha NR, Veeranna HB, Banu V in 2011 on 120 health volunteers showed statistically significant increase in Total cholesterol with age and also statistically significant increase in VLDL and LDL in reproductive and post-menopausal women.⁸

Our study thus shows that the changes that occur in the Lipid Profile after menopause is not friendly for the CVD health of our women. The elevated TG and VLDL with the reduction in the cardio protective HDL is an indication that menopause is an independent risk factor for developing CVD in our environment.

ORIGINAL ARTICLE

It should be noted that postmenopausal women have unfriendly Lipid Profile. It is thus important to note this and means of correcting the dyslipidemia. Hormone replacement therapy being controversial, counseling on proper dietary, social and physical habits is important.

CONCLUSION: The incidence of cardiovascular disease increases with age in both sexes, but in women the risk increases markedly after menopause and eventually becomes equivalent to that of men. The hormonal changes associated with menopause i.e. low plasma levels of estrogen and marked increase in LH and FSH levels exerts a significant effect on plasma Lipids and lipoproteins.

In the present study there was no significant difference in cholesterol and LDL but significant difference were observed in Triglycerides, HDL and VLDL.

According to the present study, menopause is associated with altered Serum Lipid Profile and thus it is an independent risk factor for developing Cardio Vascular diseases. Therefore it is important to consider each and every and every post-menopausal woman to undergo screening for abnormal Lipid Profile. Estrogen has protective effects on the cardiovascular system due to which there is an increase in the prevalence of cardiovascular disease in postmenopausal women. Estrogen also has a favorable effect on body fat distribution and improvement in the insulin sensitivity.

Cardiovascular disease is one of the leading causes of death in women. The incidence of myocardial infarction in women, although lower than in men, increases dramatically after menopause, which can be attributed mainly to the lack of estrogen and its direct and indirect cardio-protective effects. Specific Health Education strategies are required in order to prevent the emerging cardiovascular diseases in post-menopausal women. Further research in cardio protective estrogens is needed.

REFERENCES:

1. JC Igweh, IU Nwagha, JM Okaro the effects of menopause on the serum lipid profile of normal females of south east Nigeria. Nigerian journal of Physiological Sciences Vol. 20 (1&2) 2005: 48-53.
2. Zafar hussian, Muhammed Akram, Sharoon M. Muhammed Akram et al. Postmenopausal women: Atherosclerotic risk factors. Professional Med J 2007 Sep; 14(3): 484-90.
3. Quinlog W, Christian H, Pernile R, Shuling W, Claus C. Total and regional body composition changes in early postmenopausal women: Age related or menopause related, Am J Clin Nutr 1994; 60:843-8.
4. CAO Usoro, CC Adikwuru, IN Usoto, AC Nsonwu. "Lipid profile of postmenopausal women in Calabar, Nigeria". Pakistan journal of nutrition 2006; 5(1):79-82.
5. Chee JK, Tae HK, Wang SR, UN HR. Influence of menopause on HDL-C and lipids J Korean Med Sci 2000;15:380-86.
6. Srinivas Reddy Kilim, Srinivasa Rao Chandala. A comparative study of lipid profile and oestradiol in pre- and post - menopausal women. J Clin Diagn Res. 2013 Aug; 7(8); 1596-1598.
7. Rupal Dosi, Nikita Bhatt, Priyanki Shah, Rushad Patell. Cardiovascular Disease and Menopause. Journal of Clinical and Diagnostic Research [Serial online] 2014 02 [cited: 2014 Oct21]2 62-64.
8. Bhaghya V. Hemalatha NR, Veeranna HB, Banu V. Serum Lipid profile in prepubertal reproductive and postmenopausal woman, int. J Biol Med Res. 2011;2(3) 639-641.

ORIGINAL ARTICLE

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