ORIGINAL RESEARCH PAPER

Volume-7 | Issue-3 | March-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

COMPARISON OF GENERAL PHYSICAL AND LIPID PROFILE OF PRE AND POST MENOPAUSAL WOMEN ATTENDING OPD OF A TERTIARY HEALTH CARE INSTITUTE OF HARYANA, INDIA.

Biochemistry

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ABSTRACT

Background: "Menopause" term is derived from the Greek word 'men' means 'month' and 'pauo' means 'to stop' that is cessation of menstrual period. Menopause is a natural step in the process of ageing in a woman's life. The hormonal changes associated with menopause e.g., low plasma levels of estrogen and marked increase in follicle stimulating hormone levels exert a significant effect on metabolism of plasma lipids and lipoproteins. A number of changes that occur in the lipid profile after menopause are associated with increased cardiovascular disease risk

Objective: To compare lipid profile status in pre and post menopausal women.

Materials and Methods: This was a cross-sectional study conducted among total 100 female subjects including 50 healthy premenopausal women as controls and 50 healthy postmenopausal women as cases. Effort was made to match the controls with cases .5 ml fasting venous samples was taken for serum measurement of lipid profile i.e. TG, HDL, LDL, VLDL and serum cholesterol and samples were analysed in semi-auto analysers.

Results: The distribution of body weight and BMI among both of the groups has been found statistically significant hence the significant increased levels of BMI as well as body weight was observed in postmenopausal group in comparison of premenopausal women. (p value <0.05) and similarly lipid profile distribution among both of the group was also found statistically significant.

Conclusion : This study suggests that there is increase in atherogenic lipid profile in postmenopausal women as compared to premenopausal women i.e. postmenopausal women have more cardiovascular disease risk hence a timely health check up must be intensified specially among postmenopausal women.

KEYWORDS

menopause, lipid profile, BMI.

Introduction

"Menopause" term is derived from the Greek word 'men' means 'month' and 'pauo' means 'to stop' that is cessation of menstrual period. Menopause is a natural step in the process of ageing in a woman's life, when her menstruation stops and she is no longer fertile due to depletion of ovarian follicles and gradual decrease in ovarian production of estrogen and other hormones[1]. Every women undergoes menopause, which is an unavoidable physiological age dependent phenomenon, though age of entering in this phase of life and symptoms are different for every women. It has been observed that there is increased production of free radicals after menopause which is due to sudden alterations in hormonal status[2]. The hormonal changes associated with menopause e.g., low plasma levels of estrogen and marked increase in follicle stimulating hormone levels exert a significant effect on metabolism of plasma lipids and lipoproteins[3] .A number of changes that occur in the lipid profile after menopause are associated with increased cardiovascular disease risk.[4,5] Lack of estrogen is an essential factor in this mechanism[6]. It has been proposed that estrogen exerts cardioprotective 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)[7,8].Lack of estrogen is an essential contributory factor in the derangement of lipid metabolism in post-menopausal women which is associated with increased cardiovascular risk[9]. Currently, post-menopausal women account for more than 30% of the female population at risk for CAD in India[10].

Objective

To compare general physical & lipid profile status in pre and post menopausal women.

Materials and Methods

This was a cross sectional study conducted in the Department of Biochemistry in collaboration with Department of Obstetrics and Gynaecology of PT. B.D. Sharma, PGIMS, Rohtak. In the present study, total hundred female subjects including fifty healthy premenopausal women as controls and fifty healthy postmenopausal women as cases were enrolled for the study. Effort was made to match the controls with cases with respect to socioeconomic and nutritional status. **Inclusion criteria for cases and controls:** 1.Healthy premenopausal (twenty five to forty years) women without any menstrual irregularities.**2.** Healthy postmenopausal women with history of natural menopause (within three to five years of menopause). **Exclusion Criterion for cases and controls:** 1. History of cardiovascular diseases. 2.History of rheumatoid arthritis. 3. History of radiotherapy.4. History of liver and renal disease .5. History of endocrinal disease. 6. Women on antioxidant, and vitamin supplements. 7. Women on Hormone Replacement Therapy

Sample collection: Five ml of venous blood was drawn under aseptic precautions from antecubital vein in appropriate blood collection tubes. Samples were collected after overnight fast of 10–12 hours. Samples were processed with in one hour of collection. Serum was separated by centrifugation at 2000 rpm X 10 minutes after clotting. Separated serum was stored at -20°C if not analysed immediately.

Data collection - a semi structured open and close ended quationarre based proforma was used to collect all information of participants as general physical profile and biochemical profile .Verbal and written consent was obtained before enrolling participants and there was no any ethical issue in the present study.

Data analysis- it was done by using SPSS version 21.

Estimation of lipid profile : It was done by principle based on enzymatic method and measured by semi auto analyser as per following principles-

Serum Triglycerides (TG)

$$TG + H_2O \xrightarrow{\text{lipases}} \text{glycerol} + \text{fatty acid}$$

$$\text{Glycerol} + ATP \xrightarrow{GK} \text{glycerol3-phosphate} + ADP$$

Glycerol 3 phosphate + O_2GPO DHAP + H_2O_2

$2\,H_2O_2$ + 4-aminophenazone + 4 chlorophenol POD quininamine + HCl + $4\,H_2O$, absorbance is read at 500nm.

Serum High density lipoprotein cholesterol (HDL)

1. Elimination of chylomicron, VLDL, and LDL cholesterol by cholesterol esterase, cholesterol oxidase and by catalase
2. specific measurement of HDL cholesterol after release of HDL cholesterol by detergent and intensity of quinoneimine dye produced is directly proportional to concentration, O.D.is read at 600 nm

Serum Low density lipoprotein (LDL) cholesterol

Was calculated by Friede wald equation[11] as per following-

LDL-C = TC- (HDL-C + VLDL-C)

Serum VLDL cholesterol

TG/5[11]

Serum cholesterol

Cholesterol ester + H_2O Cholesterol esterase cholesterol + fatty acid

Cholesterol+ O_2 cholesterol oxidase cholestenol 3- one + H_2O_2

H_2O_2 + phenol + 4- aminoantipyrine peroxidise Quinoneimine +4 H_2O_2

Results

All the subjects were subjected to detailed history taking as per proforma. Test parameters were tabulated as per the master chart. The results were expressed in terms of mean ± SD. The p value <0.05 was considered as significant. In the present study most of the premenopausal women i.e. 60 % were belong to age group(**Table no 1.)** 25 to 29 years, 34% were belong to age group 30- 34 years and 6% were in age group of 35 to 39 years. Most of the postmenopausal women were in the age group of more than 50 years i.e. 86 % and only 14 % were in the age group 46 to 50 years

In the present study the mean body weight **(Table no.2)** of premenopausal group was found 52.24± 4.51 kg, mean height was found 154.34 ± 2.85 cm and the mean body mass index was calculated 21.95± 2.06. In the same way in postmenopausal group the mean body weight was found 60.56 ±4.47 kg, mean height was found 154.16 ± 2.89 cm and the mean body mass index was calculated 25.51 ± 2.22.

The distribution of body weight and BMI among both of the groups has been found statistically significant hence the significant increased levels of BMI as well as body weight was observed in postmenopausal group in comparison of premenopausal women. (p value <0.05) In the present study,**(Table no 3)** the mean ± SD values of T.G. in the premenopausal group was observed 97.180 ± 18.57mg/dl, total cholesterol was found (mg/dl) 172.83 ± 26.49, HDL was found (mg/dl) 51.52 ± 7.00, LDL was found (mg/dl) 101.87 ± 28.16 and VLDL was found(mg/dl)19.43 ± 3.71.In other hand in postmenopausal group the mean ± SD of TG was observed (mg/dl) 190.10 ± 18.47, cholesterol was found (mg/dl) 199.16 ± 20.86, HDL was found (mg/dl) 34.10 ± 6.36, LDL was found (mg/dl) 127.05 ± 19.28 and VLDL was found (mg/dl) 38.00 ± 3.69.

Table No.1 Age wise distribution of study subjects

Age group (years)	Premenopausal	Postmenopausal
25-29	30(60%)	-
30-34	17(34%)	-
35-39	3(6%)	-
40-44	-	-
45-49	-	7(14%)
>50	-	43 (86%)
Total	**50(100%)**	**50(100%)**

Table No.2 Distribution of study subjects as per general physical profile

Parameter		Premenopausal	Postmenopausal	p value
Weight (kg)	Mean ± SD	52.24 ± 4.51	60.56 ± 4.47	< 0.05
	Range	44-59	50-69	
Height (cm)	Mean ± SD	154.34 ± 2.85	154.16 ± 2.89	0.75
	Range	147- 161	147-162	
BMI	Mean ± SD	21.95 ± 2.06	25.51 ± 2.22	< 0.05
	Range	16.97- 26.57	20.95- 29.77	

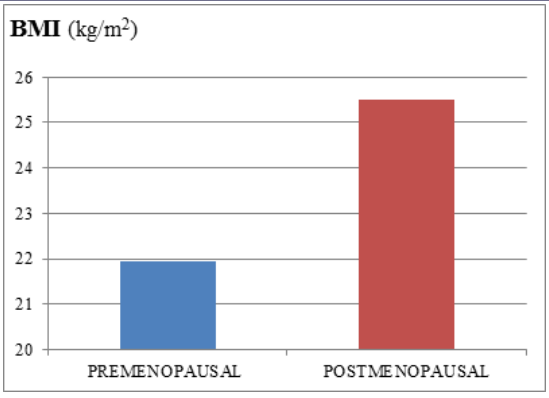

Image 1- BMI in premenopausal and postmenopausal women

Table No. 3 Distribution of participants on the basis of Lipid Profile

Parameter		Premenopausal	Postmenopausal	p value
T.G.	Mean ± SD	97.18 ± 18.57	190.10 ± 18.47	< 0.05
(mg/dl)	Range	65-175	130.2-218	
CHL	Mean ± SD	172.83 ± 26.49	199.16 ± 20.86	< 0.05
(mg/dl)	Range	88.8-222.6	135.04-229.4	
HDL	Mean ± SD	51.52 ± 7.00	34.10 ± 6.36	< 0.05
(mg/dl)	Range	31-60	22-49	
LDL	Mean ± SD	101.87 ± 28.16	127.05 ± 19.28	< 0.05
(mg/dl)	Range	12-154	68- 161.20	
VLDL	Mean ± SD	19.43 ± 3.715	38.00 ± 3.69	< 0.05
(mg/dl)	Range	13-35	26.04- 43.6	

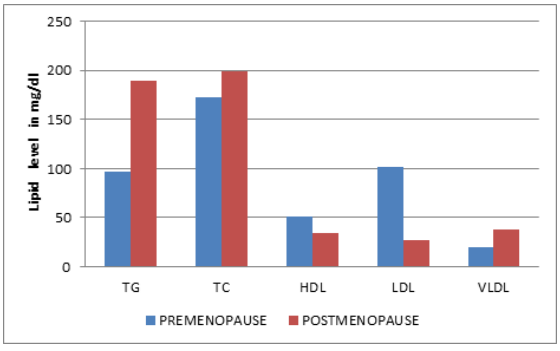

Image 2- Various lipid profile in pre and postmenopausal women

DISCUSSION

In the present study in premenopausal group, 60 % women were belonged to 25-29 years of age, 34% women were in the age group of 30 to 34 years and 6% women were in the age group of 35 to 39 years and the mean age was 29.30 ± 3.41years.In postmenopausal group, 60% women were in the age group 50 -54 years and 20 % women were in the age group of 55 to 59 years and the mean age was 54.04 ± 2.40 years. The age group distribution of our study was found to be comparable with the similar studies conducted by Shrivastava et al.[12],Deepthi et al [13] and Chinayere et al.[14] In the present study the mean body mass index was found 21.95 ± 2.06 kg/m^2 in premenopausal group and 25.51 ± 2.22 kg/m^2 in postmenopausal group. The statistically significant increased levels of BMI was observed in postmenopausal group with p value < 0.05. It is comparable with the study conducted by Chinayereet al.[14]BMI depends on physical activity, life style, dietary habits, ethnic group and genetic makeup of individual. Pansini et al[15]found that menopause is generally accompanied by an increase in body weight, particularly in the upper body. Estrogen activates the enzyme transhydrogenase which catalyses transfer of reducing equivalents from NADPH to NAD^+. In postmenopausal women this reaction being impaired, the NADPH tends to accumulate and is diverted towards lipogenesis causing weight gain and obesity and thus increased BMI.[16] In the present study the level of serum total cholesterol was found to be increased in postmenopausal women than in comparison of premenopausal women, the mean level of total cholesterol was found 172.83 ± 26.49mg/dl in premenopausal group and the mean level of total

cholesterol was found 199.16 ± 20.86mg/dl in postmenopausal group, and it was found statistically significant ($p < 0.05$). The findings of our study were in consistent with the studies done by Deepthi et al[17],Shrivastava et al.[18] In the postmenopausal women due to estrogen deficiency, as the concentration of all the atherogenic lipoprotein increases, the concentration of total cholesterol also increases. Estrogen decreases total cholesterol and low-density-lipoprotein (LDL) cholesterol due to an increase in the liver LDL-receptors, and enhancement of LDL-catabolism and clearance.In our study we found that the level of serum triglyceride was found to be increased in postmenopausal women than in comparison of premenopausal women. In the present study in premenopausal group the mean triglyceride level was 97.18 ± 18.57 mg/dl while in postmenopausal group the mean level was 190.10 ± 18.47 mg/dl. The mean triglyceride level was increased in postmenopausal group as compared to premenopausal group and was statistically significant ($p < 0.05$). Findings of our study were comparable with the findings of Deepthi et al[17]and Shrivastava et al[18]In the postmenopausal women the higher body weight is due to increased fat accumulation which is due to decreased estrogen, decreased insulin gene expression and decreased insulin tolerance hence lipolysis which leads to release of free fatty acids into the circulation and excessive free fatty acids provide substrate for hepatic triglyceride and triglyceride rich lipoprotein production in postmenopausal women.In the present study mean level of HDL in premenopausal group was 51.52 ± 7.00 mg/dl and it was 34.10 ± 6.36 mg/dl in postmenopausal group. The mean value of HDL increased in premenopausal group with respect to postmenopausal group and was found statistically significant ($p < 0.05$). Deepthi et al,[17]Das et al[19]and Awasthi YC et al[18]had also found similar result, while Gwen J et al.[20]had got the opposite findings with our study and showed that postmenopausal increased risk of coronary artery disease is not related to HDL level. This may be due to decreased hepatic lipase activity that catabolises HDL and increased activity of apolipoprotein –A1 activity by estrogen, which is decreased in menopause. In the present study mean level of LDL in premenopausal group was 101.87 ± 28.16 mg/dl and it was 127.05 ± 19.28 mg/dl postmenopausal groups and mean level of VLDL in premenopausal group was 19.43 ± 3.71mg/dl and it was 38.00 ± 3.69 mg/dl in postmenopausal group. The VLDL and LDL showed increase in postmenopausal group as compared to premenopausal group and this increase was found statistically significant ($p < 0.05$). The findings of our study was in accordance with the studies of Deepthi et al.[17]the possible cause behind this may be due to estrogen stimulates LDL receptor synthesis, results in increased clearance of LDL particles by hepatocytes. Mainly adrenal cortex and gonads uses LDL as gonadal activity decreases during menopause hence LDL level increases in menopause. Decrease in physical activity also alter lipid profile in postmenopausal women. Exercise increases lipoprotein lipase activity and decreases TC, TG and VLDL. Thus decrease estrogen, decrease physical activity and less active gonad collectively alter lipid profile in postmenopausal women. Whereas no significant difference was observed among postmenopausal women and premenopausal women lipid profile by Unfer T. C et al[21] that was may be due to small sample size which including twenty four premenopausal women and thirty one postmenopausal women or that was may be due to those study subjects were involve in light physical exercise once or twice a week.

CONCLUSION

This study suggests that there is increase in atherogenic lipid profile in postmenopausal women as compared to premenopausal women i.e. postmenopausal women have more cardiovascular disease risk hence a timely health check up must be intensified specially among postmenopausal women.

Sources of support in the form of grants-NIL
Interest of conflict- NIL

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