Evaluation of Serum Lipid Profile in Pre and Postmenopausal Woman: A Hospital Based Study

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ABSTRACT

Background: This present study aims to measure the levels of lipid profile in women before and after menopause, which is considered as an indicator to increase the likelihood of cardiovascular disease.

Subjects and Methods: A total of 90 subjects were enrolled in the study out of which 45 premenopausal women (aged;26–44) with regular menstrual cycle while 45 postmenopausal women (aged; 46–60) with cessation of menses for at least one year.

Results: Comparison of lipid fractions between premenopausal and post-menopausal women of overweight group with high BMI (25-29.9), and this revealed that there is significantly higher levels of Total cholesterol, LDL, and triglycerides in post-menopausal group as compared to pre-menopausal group (p<0.001). HDL was significantly lower in the postmenopausal as compared to pre-menopausal group (p<0.001).

Conclusion: Significant increase in total cholesterol, LDL-C, TG while decreased levels of HDL-C in post-menopausal women. We have conducted the study in premenopausal as well as postmenopausal women of normal BMI and overweight.

Keywords: Pre & Post Menopause, Body Mass Index and Lipid Profile.

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INTRODUCTION

Menopause is the cessation of menstrual cycle in women. It represents a transitional phase in the natural biological woman's age, a natural event that marks the end of the reproductive years of women in terms of the menstrual cycle permanently stopped and the resulting stop ovarian function in females.[1] Most of the women at this stage suffer from a variety of symptoms due to hormonal changes and these symptoms are possible to be severe and frequent, some women have more severe symptoms and others do not suffer from any symptoms at all.[2] This age can be divided into: the period before menopause (Pre menopause) representing any reproductive period before menopause they represent years before the last menstrual period.[3] And to the period after menopause (Post Menopause), is the period of a woman's life that comes after the last menstrual cycle, i.e. when the ovaries completely stop working, regardless of the reasons for the drop naturally or because of disease.[4] There are various hormonal changes which take place in women after menopause and lead to alterations in lipid metabolism and increase the risk of

coronary artery disease in women.[5] The increase in the proportion of lipid in the body is a major cause of heart and blood vessels diseases and is the most common, where it causes deaths in females after menopause.[6]

Imbalance and Dyslipidemia in fat state increases the risk of cardiovascular disease. Up to the age of 50 yrs incidence of CAD is lower in women but after that the incidence becomes similar in both men and women.[7] As Life expectancy is increasing in terms of age in women and menopause remains relatively unchanged, so women are now spending more of their life in the post-menopause period. Sixty million women in India are above the age of 55 years.[8] It is therefore important to know all menopause related diseases of the women so necessary action can be taken for their healthy life after menopause. Increase in the incidence of cardiovascular disease is related to many risk factors such as Hypertension, Diabetes mellitus, Dyslipidemia, increase in body weight, ageing process, physical inactivity, mental stress, smoking and alcohol intake.[9]

In the United States, more than 500,000 women die of cardiovascular disease and about half are due to coronary artery disease (CAD). As the incidence of CAD is higher in men but it increases significantly in women after menopause.[10] The changes in the hormonal status after menopause such as low estrogen, increased luteinizing hormone and follicular stimulating hormone exert significant effect on plasma lipids and lipoproteins metabolism in post-menopausal women. In the present study we tried to correlate some of the risk factors as altered lipid profile is associated with increased risk of CAD caused by hormonal changes taking place during menopause. Hypercholesterolemia is a key factor in the pathophysiology of atherosclerosis. Aim of present study is evaluation of serum lipid profile in post-menopausal women and compare these with pre-menopausal women of reproductive age group with reference to body mass index.

MATERIALS AND METHODS

This present study was conducted in the Department of Obstetrics and Gynecology in collaboration with Biochemistry department at World College of Medical Sciences and Research, Jhajjar, during the period November, 2018 to September, 2019. The study was conducted after getting ethical committee clearance from the institute. Informed, written and understood consent of the participants were taken. A total of 90 subjects were enrolled in the study out of which 45 premenopausal women (aged;26–44) with regular menstrual cycle while 45 postmenopausal women (aged;46–60) with cessation of menses for at least one year. The subjects having risk factors which may have an effect on lipid profile like diabetes mellitus, hypertension (BP > 140/90), chronic kidney disease, chronic liver disease, smoking, dyslipidaemia, alcoholism, tobacco chewing, nephrotic syndrome, hypothyroidism and patients on drugs like estrogen, progesterone, beta blockers, steroids, statins and a positive family history of CAD were excluded from the study.

Biochemical Analysis

Fasting 5ml venous blood samples were collected from all participants in plane bulbs. Samples of premenopausal women were taken in early follicular phase i.e. between 3rd - 5th day of menstrual cycle in plane bulbs. Unique ID was given to all participants and same ID was mentioned on sample bulb to hidden identity of patients. Serum was separated after 1 hour by centrifugation at 2500 rpm for 10 minutes, and was tested for following parameters[11]:

- Total serum Cholesterol (TC) was determined by enzymatic (CHOD-PAP) colorimetric method
- Triglyceride (TG) by enzymatic (GPO-PAP) method
- High density lipoprotein (HDL-C) was estimated by precipitation method
- Low density lipoproteins (LDL-C) by Friedewald formula.

BMI is also known as Quetelet's index.[12] It was calculated by following formula. The Anthropometric measurements were done. Height was measured in Meter and weight was taken in Kgs. By these data BMI was calculated.

- ✓ BMI = Weight in Kg / Height in M^2

All the values obtained above were arranged in a table form and master chart was prepared and statistical analysis was done by SPSS-22 software by using student's t test.
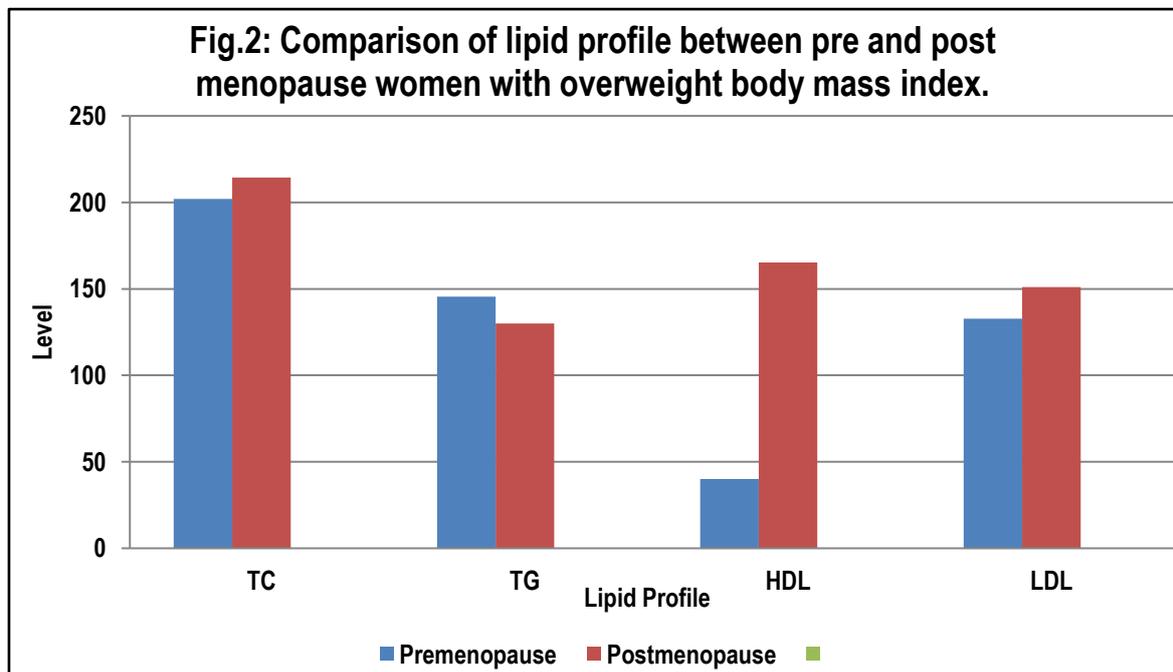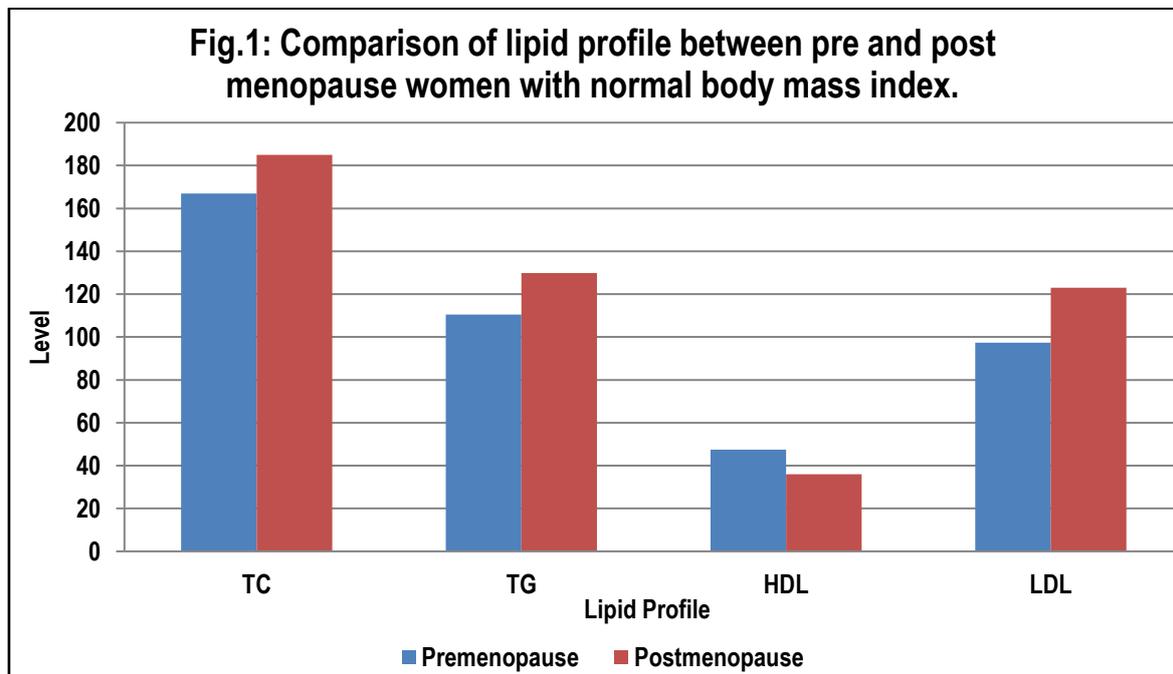
Table 1: Anthropometric parameter of study group:

Parameter	Pre-menopausal women			Post-menopausal women		
	BMI		P value	BMI		P value
	18.9-24.9 (Mean ±SD)	25-29.9 (Mean ±SD)		18.9-24.9 (Mean ±SD)	25-29.9 (Mean ±SD)	
Weight in kg	58.7 ± 2.1	64.3 ± 2.8	<0.001	58.7 ± 2.0	64.6 ± 2.4	<0.001
Height in cm	157.5 ± 1.2	157.2 ± 0.9	0.23**	155.6 ± 0.6	153.5 ± 0.9	0.12**
BMI	23.6 ± 0.79	27.3 ± 1.1	<0.01	24.2 ± 0.5	27.4 ± 1.2	<0.01

Statistically Significant (P<0.05); **Statistically not Significant (P>0.05)

Table 2: Lipid profile in pre and post-menopausal women of normal & overweight weight group:

Biochemical Parameters	Menopausal women			Menopausal women		
	Pre (18.9-24.9) (Mean ±SD)	Post (18.9-24.9) (Mean ±SD)	P value	Pre (25-29.9) (Mean ±SD)	Post (25-29.9) (Mean ±SD)	P value
TC (mg/dl)	167.0 ± 6.4	185.0 ± 5.8	<0.001	202.0 ± 5.2	214.4 ± 4.8	<0.001
TG (mg/dl)	110.5 ± 3.6	129.9 ± 8.3	<0.05	145.5 ± 6.2	165.2 ± 6.2	<0.001
HDL (mg/dl)	47.5 ± 4.6	36.0 ± 3.5	<0.02	40.0 ± 2.6	34.2 ± 3.0	<0.001
LDL (mg/dl)	97.3 ± 5.7	123.0 ± 7.0	<0.001	132.8 ± 5.5	151.0 ± 4.2	<0.001

*Statistically Significant (P<0.05)

Fig.1: Comparison of lipid profile between pre and post menopause women with normal body mass index.

Fig.2: Comparison of lipid profile between pre and post menopause women with overweight body mass index.

OBSERVATIONS AND RESULTS

Premenopausal women age ranges from 26 to 44 with a mean age of 34.12 and postmenopausal women age ranges from 46 to 60 years with mean age of 52.5 years. These are the various observations we found out in this study.

In Table -1 we have depicted the physical characteristics in terms of body weight, height and BMI of both the groups of pre as well as post-menopausal women. We have observed that there is a statistically significant difference in weight as well as BMI of normal and overweight group (p<0.05).

In Table -2 we did the comparative study of various lipid fractions in pre-menopausal and post-menopausal women of normal body weight. The levels of serum total cholesterol (TC) and serum triglycerides (TG)were significantly higher in post-menopausal women as compared to pre-menopausal women of same BMI

(P<0.05). In this study group HDL Cholesterol is significantly lower in post-menopausal women as compared to premenopausal women (p<0.02). LDL Cholesterol was also significantly higher in post-menopausal group as compared to pre-menopausal group (p<0.001).

In Table- 3 we did a comparison of lipid fractions between premenopausal and post-menopausal women of overweight group with high BMI (25-29.9), and this revealed that there is significantly higher levels of Total cholesterol, LDL, and triglycerides in post-menopausal group as compared to pre-menopausal group (p<0.001).

HDL was significantly lower in the postmenopausal as compared to pre-menopausal group (p<0.001). Similar changes were also found by Bade et al.[3]

DISCUSSION

Menopause is a characteristic occasion in the maturing cycle of a lady and means the finish of conceptive years with suspension of cyclic ovarian capacities as showed by cyclic period. Cardiovascular ailment is a main source of mortality in the two people in industrialized world. The different physiological danger factors for cardiovascular sickness are unpredictable and the frequency of cardiovascular ailment increments with age in both the genders, yet in ladies the danger increments extraordinarily after menopause.[7] Menopause is the perpetual end of feminine cycle which is reflectively decided after a year of amenorrhoea.[8] The prompt manifestations of menopause are the impacts of hormonal changes on different organ frameworks basically on cardiovascular framework. The normal period of menopause is 50.5 yrs, yet a few ladies may enter menopause at prior age. Studies have shown that women are at less risk of developing CAD than their male counterparts, but this benefit is abolished after 60 years of age. After menopause, as there is loss of ovarian functions and depletion of various ovarian hormones. These results in adverse changes in glucose and insulin metabolism, body fat distribution, coagulation, fibrinolysis and vascular endothelial dysfunction. We would like to demonstrate various hormonal changes which takes place during menopause. The major effect of Estrogen on lipid metabolism is by its action on regulation of various LDL receptors in Liver. Estrogen acts on these LDL receptors on the hepatocytes and leads to increased clearance of LDL-C particles. By this mechanism levels of LDL-C are regulated in the serum. If the concentration of small dense particles is increased it is characterized by elevated serum total cholesterol, triglycerides, LDL-C and reduced HDL-C. In association to these changes in lipid profile the individuals also show increased adipose tissues and increased insulin resistance.[9] These fractions of lipid profile are highly atherogenic and lead to increased chances of CAD.

Estrogen increases HDL-C which is considered to be good cholesterol for CVS by increased hepatic productions of Apolipoprotein -A and decreased hepatic elimination of HDL2 cholesterol by decreasing the activity of hepatic lipase enzyme. Since during menopause estrogen is low and which leads to hampering of all these functions.[10] We have excluded in our study, all the factors which may alter the lipid profile. There is no difference in the results of normal weight as well as overweight postmenopausal women. So, we concluded that these changes observed in lipid profile of these postmenopausal women are due to deficiency of hormone estrogen and not related to BMI. Several other studies also have observed similar results.[11,12] Menopause is also associated with decreased physical activity which leads to altered lipid profile. During exercise free fatty acids are required for energy production which is in turn produced by metabolism of triglycerides in the adipose tissues. The triglycerides are hydrolyzed to free fatty acids and glycerol by lipoprotein lipase enzyme. Adrenal cortex and gonadal hormones are also responsible for degradation of lipids. As gonadal activity is also less in post-menopausal period. All these factors combined together leads to elevated TC, TG, LDL-C, and reduced HDL-C levels in serum of post-menopausal women leading to increased risk of CAD. As obesity is also a risk factor for CAD in women. If there is increase in one unit of BMI, there is 4- 5 % increased risk of CAD. In this study we have found that there is significant increase in serum total cholesterol TC, LDL-C, Triglycerides in the post-menopausal females as compared to premenopausal women (p<0.05). And there is significantly low level of serum HDL-C in post-menopausal women (p<0.05). In our study we have compared the lipid profile fractions in premenopausal with normal weight and overweight and compared with post-menopausal women of normal weight and overweight. As on comparison we have not found any significant difference in results with reference to body weight. We concluded that these changes in lipid profile in post-menopausal group are due to hormonal changes not because of BMI. Our study is in accordance with Bonithon-Kopp who concluded that total cholesterol and LDL cholesterol significantly increased in postmenopausal women.[13] As the part of different medications like HRT and statins are as yet dubious, we suggest that there ought to be a thorough way of life alteration regarding every day practice standard, low fat eating routine ought to be devoured to decrease the degrees of TG, LDL-C, TC and to build the degree of HDL-C to lessen the cardio vascular danger proportion and rates of CAD in post-menopausal women.

CONCLUSION

These findings suggest that, as the atherosclerosis is the principle guilty party for improvement of CAD. Also, the lipid profile shows huge increment in complete cholesterol, LDL-C, TG while diminished degrees of HDL-C in post-menopausal women. We have directed the investigation in premenopausal just as postmenopausal women of typical BMI and overweight. Be that as it may, we were unable to exhibit any distinction in the outcomes because of weight. So, we infer that these progressions found in the lipid profile of postmenopausal women are because of diminished estrogen levels. So postmenopausal women ought to be directed in regards to way of life alteration with low fat, high fiber diet and exercise to lessen the occurrence of CAD which is the significant worry in the current time, As the rates of CAD are truly expanding in postmenopausal women nowadays.

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