

RESEARCH ARTICLE

A study of correlation between body mass index and lipid profile in postmenopausal women

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ABSTRACT

Background: Menopause is a physiological event in every woman's life which is characterized by cessation of menses due to hormonal changes. Menopause occurs between the late 40s and early 50s. Postmenopausal women are particularly at risk of cardiovascular complications due to loss of protective effect of estrogen on cardiovascular system. During menopause, there is fall in estrogen and progesterone levels. After menopause, there is increase in fat storage with simultaneous lipid deposition in central part of body. The body mass index (BMI) has a major influence on blood pressure and lipid profile and as such is a good predictor of hypertension and hyperlipidemia. Menopause predisposes the woman to the risk of ischemic heart disease. **Aims and Objectives:** This study was carried out to correlate between BMI and blood triglyceride level and low-density lipoprotein (LDL) in postmenopausal women. These parameters were studied in 100 postmenopausal apparently healthy women. **Materials and Methods:** Our study was approved by the institutional ethics committee. The subjects were divided into two groups according to the duration of their menopause period <5 years and >5 years. Parameters studied were BMI and triglycerides and LDL. **Results:** In our study in both groups, BMI values were raised but statistically not significant ($P = 0.920$), and in lipid profile, triglycerides ($P = 0.059$) and LDL cholesterol were raised and were statistically significant ($P = 0.307$). **Conclusion:** Since postmenopausal women lack cardioprotective action of estrogen, they are prone to cardiovascular diseases faulty habits of diet and lifestyle further increase the risk of cardiovascular disease. Awareness among perimenopausal women about menopause and cardiovascular health should be created and women are encouraged to adapt healthy life.

KEY WORDS: Postmenopause; Estrogen; Lipid Profile; Body Mass Index

INTRODUCTION

In our modern society, the women have become sufficiently aware about breast cancer, but they are unaware about cardiovascular diseases after menopause yet.

According to the American Heart Association report (2002), on postmenopausal women, 70% of women develop cardiovascular diseases and 30% develop osteoporosis. Postmenopausal women are particularly at risk due to loss of protective effects of estrogen on cardiovascular system. Estrogen deficiency causes atherosclerosis, ischemic heart disease, and myocardial infarction.

The term menopause means women who have not experienced any menstrual flow for a minimum of 12 months; usually, it is around 50 years of age.

According to the WHO, menopause is a permanent cessation of menstruation resulting from loss of ovarian function. The

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time following menopause is referred to as postmenopause; menopause occurs between the late 40s and early 50s average being 50 years.^[1]

Menopause is a natural event in the aging process and signifies the end of reproductive years with the cessation of cyclic ovarian function as manifested by cyclic menstruation. Menopause is an estrogen-deficient state, but unlike other hormone deficient states, it is not a disease.^[2]

There is a fall in estrogen and progesterone levels which are synthesized and released by ovaries. There is a tendency to put on weight after menopause which is predisposing factor for cardiovascular disease, hypertension, etc. After menopause, there is increasing fat mass and a change in fat storage distribution. There is a tendency to deposit fat in central part of body that is abdominal location.

The body mass index (BMI) has influenced on blood pressure and lipid profile and is a good predictor of hypertension and hyperlipidemia.^[3]

After menopause, the hormonal changes cause the development of metabolic syndrome and metabolic syndrome is a cluster of risk factors for further development of cardiovascular diseases.^[4]

This study may also be useful for early diagnosis and primary prevention from cardiovascular disease in postmenopausal women. Coronary risk accelerates in women after menopause. Other contributing factors like with increasing age, sympathetic tone increases progressively. Release of adrenaline in circulation results in lipolysis further increasing blood lipid level. Considering the multifocal effects, we have given preference to study this BMI; lipid profile changes parameters in postmenopausal women.

MATERIALS AND METHODS

This is a cross-sectional study in 100 postmenopausal apparently healthy women divided into two groups according to menopausal years 0–5 years and 6–10 years. The study was approved by the institutional ethics committee.

Before selection of subjects, aim of study, plan of investigation, and its benefits were explained to the volunteers in their vernacular language. During motivation, a short history was taken to know their health status. Informed consent was taken. The study was carried out during 8:00 AM–11:00 AM.

In this study, parameters studied were as follows:

- BMI
 1. Height was measured in centimeter by stadiometer.
 2. Weight.
 3. BMI calculated by Karada Scan.

- Lipid profile: For the estimation of lipid profile, 5 ml venous blood sample was collected after 12 h overnight fasting from each subject and lipid profile was done by semi-automated analyzer using enzymatic method. Lipids analyzed were as follows:
 - a) Triglycerides and
 - b) low-density lipoprotein (LDL) cholesterol

Data collected were statistically analyzed by unpaired *t*-test and correlation coefficient was used to determine correlation.

RESULTS

Observations of the present study are presented in Tables 1 and 2.

DISCUSSION

This is a cross-sectional comparative study carried out in two menopausal women groups: Group 1 – The menopausal

Table 1: Descriptive statistical analysis of the mean value of age, height, weight, and BMI

Menopause	Age	Height	Weight	BMI
Up to 5 years				
Number of subjects	50	50	50	50
Mean	46.78	151.34	56.86	24.82
Standard deviation	3.62	5.99	9.52	3.84
>5 years				
Number of subjects	50	50	50	50
Mean	54.16	152.29	57.86	24.90
Standard deviation	3.45	5.96	11.08	4.29
Unpaired <i>t</i> value				
<i>t</i> -value	10.427	0.795	0.484	0.101
<i>P</i> -value	<0.001	0.429	0.629	0.920

BMI: Body mass index

Table 2: Descriptive statistical analysis of the mean value of BMI, triglyceride, and LDL

Menopause	BMI	Trig	LDL
Up to 5 years			
Number of subjects	50	50	50
Mean	24.82	137.16	121.20
Standard deviation	3.84	56.46	37.93
>5 years			
Number of subjects	50	50	50
Mean	24.90	162.92	112.89
Standard deviation	4.29	76.94	42.84
Unpaired <i>t</i> value			
<i>t</i> value	0.101	1.909	1.026
<i>P</i> -value	0.920	0.059	0.307

BMI: Body mass index, LDL: Low-density lipoprotein

women up to 5 years of menopause period and Group 2 – The menopausal women >5 years of menopausal period.

There were changes in BMI and lipid profile in postmenopausal women. The values of BMI and lipid profile were raised. This could be due to less estrogen in postmenopausal women which has cardioprotective role.

In our study, there is increase in BMI in Group 1 and Group 2. However, it was not statistically significant as compared to two groups ($t = 0.101$, $P = 0.920$). BMI mean values were not showing any significant change as per duration of menopause period.

BMI seemed to be a good predictor of hypertension and hyperlipidemia in a rural Japanese population and reported that BMI has an influence on blood pressure and lipid profile. Thus, BMI is a good predictor of hypertension and hyperlipidemia. The findings of the present study are similar with Carels and Darby.^[5,6]

The prevalence rates of overweight (BMI 25) and obesity (BMI 30) increase in postmenopausal women. In their study, mean BMI was found to be 24.11 ± 2.92 and 22.84 ± 3.05 in cases and control, respectively, and it was highly significant as reported by Walulkar and Sagdeo.^[7]

Increase in incidence of cardiovascular disease in menopausal women may be attributed to increase in LDL cholesterol and serum triglycerides and decrease in high-density cholesterol during perimenopause. Whereas increase in blood pressure, fasting blood glucose level, weight, and waist circumference increase after menopause. Because the risk increases in postmenopausal women, there is a need for an increased awareness of the importance of cardiovascular disease. Risk of cardiovascular disease is high in postmenopausal women. By changing the lifestyle and with the help of exercise, there will be definitely reduced cardiovascular risk in postmenopausal women.

Our study emphasizes on postmenopausal health in women and the likely risks they are exposed to menopause is a phase of transition in women associated with a constellation of physical changes. This study tries to bring awareness about the likely changes and estrogen deficient risks.

Hormonal assays would have been more appropriate in our study.

Our findings suggest that women in premenopausal and postmenopausal period should undergo follow-up with lipid profile at regular intervals for early detection and prevention of cardiovascular disease. There is strong association between the percentage of fat and BMI in postmenopausal women. BMI more than 25 kg/m^2 is diagnosed as obesity in postmenopausal women according to Robert *et al.*^[8]

In our study, the percentage of obesity is 52% according to BMI.

As compared to reproductive age group in postmenopausal women, there is an increase in total cholesterol level, increase in triglyceride level, increase in LDL level, and decrease in HDL level. These changes are independent of BMI as the similar changes were found in women having normal weight as well as overweight. The findings of the present study were similar with other studies, Bade *et al.*^[9]

In our study, there were significant change in serum triglycerides ($t = 1.909$, $P = 0.059$) and LDL ($t = 1.026$, $P = 0.307$).

In our study, BMI values and lipid profile – triglyceride and LDL values were raised.

There was no significant difference in cholesterol and LDL. However, significant difference was observed in triglycerides, HDL, and VLDL. The reduced cardioprotective HDL is an indication that menopause is an independent risk factor for developing cardiovascular disease as proposed by Latha *et al.*^[10]

To reduce these complications, the postmenopausal women should take preventive majors such as change in lifestyle, change in food habits, daily exercise, yoga, and meditation. These may reduce the risk of cardiovascular disease in postmenopausal women. Further, non-invasive and invasive evaluation of cardiovascular system should also be undertaken if required.

CONCLUSION

In our study, we observed that high BMI, triglyceride, and LDL values in postmenopausal women increase the risk of cardiovascular disease. Women with increased BMI were convinced about adopting healthy lifestyle modifications including physical exercise. Counseling was done regarding their diet and eating habits. Primary prevention of cardiovascular disease is an established component of medical practice. In clinical practice, early diagnosis is facilitating the preventive therapies of those having chorionic villus sampling complications. It also determines which patient should be referred to undergo further non-invasive and invasive evaluation of cardiovascular system.

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