

Menopause lipoprotein cholesterol levels



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LITERATURE REVIEW

Schisterman *et al.* [32] reviewed the evidence amongst the premenopausal women by comparing the lipoprotein cholesterol levels throughout the menstrual cycle. Mainly, lipoprotein cholesterol levels have been noticed to alter during the menstrual cycle as reproductive hormone levels change. During the follicular phase, triglyceride cholesterol and low density lipoprotein cholesterol are observed to be highest and throughout the luteal phase their level decreases. Meanwhile, high density lipoprotein cholesterol is frequently highest in the late follicular and pre-ovulatory phases. Increasing triglyceride cholesterol and high density lipoprotein cholesterol levels and decreasing low density lipoprotein cholesterol levels are immediately affected by estrogen, as well as non-acute effects on decreasing low density lipoprotein cholesterol, which lead to decreases in triglyceride cholesterol. Various other determinants like body mass index and the levels of other circulating reproductive hormones are affiliated.

During perimenopause, Jeung *et al.* [33] analyzed that total and LDL cholesterol levels rise and this transition in cholesterol is mainly inclined on variations in female sex hormones. The changes in lipids and lipoprotein were quantitatively estimated during perimenopausal phase and factors responsible for these changes were also examined. Thirty four women remained in the premenopausal state, thirty four perimenopausal women, and thirty six postmenopausal women were selected. Along with the history of amenorrhea, levels of female sex hormones were analyzed to determine the menstrual state. The elevated levels of cholesterol and low-density lipoprotein cholesterol were related to the transformation from

premenopause to postmenopause and respectively during perimenopause. High density lipoprotein cholesterol along with triglycerides remained unchanged in three groups.

Ryoo *et al.* [34] carried a study in USA to reevaluate the levels of lipids and lipoproteins in pre-peri and postmenopausal women. 1679 women voluntarily took part in this project. On the basis of menstrual status women were divided into three groups pre-, peri- and postmenopausal women and in each group 485, 373 and 821 subjects were enrolled. Elevated HDL ranges were observed in Perimenopausal women as compared to the premenopausal women and there was not much variation seen among peri- and postmenopausal women. Levels of total cholesterol were analyzed to be higher in peri- and postmenopausal women while, low in premenopausal women. Step wise elevation of LDL and triglycerides level was estimated from pre to post menopause.

In twenty four premenopausal women Leutholtz *et al.* [35] investigated that fourteen weeks of high intensity resistance training significantly decreased total cholesterol, LDL-C and HDL-C values. Subjects were randomly divided into two groups either a non-exercising control group or exercise training group. Each group contained twelve members. Women enrolled in exercise training group, participated for 44-50 minutes sessions of training under proper supervision. However, the non-exercising group did not participate in any planned physical training or activity. An evident decrease in percentage of body fat, levels of LDL, HDL and cholesterol was observed. Whereas none of these parameters were observed to be changed in non-exercising group.

This recommends that physical activity helps to maintain normal levels of lipid profile in premenopausal women.

The changes in lipids and lipoproteins during perimenopause in 34 women were studied by Ryu *et al.* [36]. It was figured out that throughout the perimenopause, women had high ranges of cholesterol and LDL and this elevation in LDL and cholesterol are mainly dependent on fluctuating levels of female sex hormones. The progression of women from perimenopause to postmenopause was associated with increased levels of lipid profile. Over one year about 5% and 7% increase was observed in total cholesterol levels and low density lipoproteins respectively, but during the perimenopausal phase total cholesterol levels were observed to be elevated in subjects by 13% and LDL levels increased by and subsequently 20%.

Modawe *et al.* [37] conducted a study to examine levels of lipid profile in one hundred and fifty Sudanese women within the age range of 45-58 years. 50 were selected as a control group with age range from 19-23 years to evaluate the plasma lipids. The results showed a significant difference between the mean of plasma lipids (cholesterol, triglyceride, low density lipoproteins and high density lipoproteins) of the control group compared to that of the case group. The natural menopause transition is associated with a worsening of the plasma lipid profile and increase in lipid containing deposits specially in arteries.

Relationship between lipids, menopause and early atherosclerosis in women was studied by Kim *et al.* [38]. Women were divided in to two sub-groups, premenopausal group of women containing 316 subjects and

perimenopausal group of women containing 224 subjects. Accumulation of fat and lipids in aortic and coronary arteries was analyzed and its dependence HDL was determined. The negative association of HDL-C to subclinical atherosclerosis is inadequate for perimenopausal women. Results revealed that preventive consequences of HDL may be declined due to the menopause transition.

Tyrrell *et al.* [39] carried out a study to inquire that during the final year of menstrual period, effects of the changes in coronary heart disease risk factors are more as compared to the alterations occurring before or after that time interval. 3302 women were included in this study and 1054 women reached their final menstrual period without undergoing any surgery or hormonal therapy. Lipids, lipoproteins, insulin, glucose, C-reactive protein, fibrinogen and blood pressure were the coronary heart disease risk factors which were measured. Only total cholesterol, LDL-C, and demonstrated were observed to be elevated within the 1 year interval before and after final menstrual period, consistent with menopause-induced changes. During the phase of final menstruation, women undergo a distinctive increase in lipids. Coronary heart disease can be prevented predominantly in perimenopausal women by supervising lipids.

The relationship among body mass index, serum lipid profile and estradiol levels in a sample of 155 Iraqi premenopausal women at their pre-ovulatory period was evaluated by Zaidi *et al.* [40]. The study was carried out in Al Khademiya Teaching Hospital from July 2008 to January 2010. In this study, 155 female subjects aged between 20-45 years were included. Total cholesterol, triglycerides, HDL-C, LDL-C, estradiol, insulin and fasting glucose

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level were estimated from the venous blood samples. Body mass index for all patients was calculated by using their body weight and height. The calculated mean age was 29 years and 28 was calculated as average BMI. According to the calculated BMI of the patients, 55 were obese, 50 patients were falling under the category of overweight BMI and 50 patients were found to be with BMI. The study revealed that with the increase in BMI, levels of LDL and triglycerides also increase whereas HDL ranges were observed to be in a negative association between serum estradiol and obesity. Because of the elevated BMI, higher levels of LDL, and low levels of HDL and estradiol, Iraqi premenopausal women at their pre-ovulatory period illustrate an atherogenic risk.

Nash *et al.* [41] compared the lipid profile in premenopausal and perimenopausal women and studied the cardiovascular risk profile in the study groups. Altogether seventeen women took part in this study voluntarily. While considering the menopausal status of these women, they were divided into two groups i. e. premenopausal and perimenopausal. Eleven women were included in premenopausal sub group and six women were part of perimenopausal group. Their demographic, social, medical, menopausal, hormone use, and menstrual histories were collected. For every single subject who took part in study, anthropometric, and blood pressure measures, total cholesterol, HDL, triglycerides and calculated LDL from fasting serum were estimated. The calculated mean age of premenopausal group was 24 years, and 45 years of perimenopausal. BMI along with the lipid parameters were observed to be elevated in perimenopausal women as compared to the premenopausal women.

In Abakaliki, Onimawo *et al.* [42] carried out a study to determine the relationship of lipid profile with menstrual transition and reasons that initiate or accelerate atherogenesis. 205 apparently healthy women aged between 21-60 were included. Body weight, height and plasma lipid profile was determined through standard techniques. In women with older age group majority of subjects were witnessed with abnormal levels of total cholesterol, triglycerides and LDL. Only 8.8% women had reduced HDL levels. Females in perimenopausal phase of menstruation cycle, because of elevated BMI, older age and undesirable lipid profile can become susceptible to cardiovascular diseases.