

A Comparative Study Between Estrogen and Lipoproteins in Pre and Postmenopausal Hypertensive Women

Estrogen and Lipoproteins in Pre and Postmenopausal Hypertensive

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ABSTRACT

Objective: To analyze the serum levels of estrogen and lipoproteins in pre and postmenopausal hypertensive women as compared to the normal healthy females.

Study Design: Comparative Cross sectional study

Place and Duration of Study: This study was conducted at the Biochemistry Department Peoples University of Medical Health Sciences for Women Nawabshah (PUMHSW) along the cooperation with Gynecology and Obstetrics and Medicine OPD/Ward PMCH from 1st July 2020 to 1st Jan 2022.

Materials and Methods: Blood samples were collected for biochemical testing and stored at -20°C in the laboratory. Patients were recruited from the Gynecology and Obstetrics and Medicine OPD/Ward PMCH, whereas healthy volunteers were recruited from the general public by filling out a proforma. After explaining the study's goal to all participants, they gave their written and verbal agreement. This study involved 600 individuals who were separated into three groups. Using the ANOVA test, descriptive statistics were presented as mean and standard deviation. A test PEARSON was performed for correlation of serum estrogen and lipoproteins

Results: The serum oestrogen level was raised in normal, healthy females as compared to the pre- and postmenopausal participants. The level of the lipid profile was high in postmenopausal women in comparison with premenopause and the control group. The correlation between the serum oestrogen and lipid profile found a positive correlation of oestrogen with HDL-C and a negative correlation with total cholesterol, triglycerides, LDL-C, and the results showed an insignificant positive correlation of oestrogen with VLDL.

Conclusion: We concluded in this study that women after the menopause were at high risk of developing hypertension and other comorbidities, and the current study expected to understand the relationship of oestrogen level and lipid status in pre- and postmenopausal hypertensive women.

Key Words: Menopause, premenopause, postmenopause

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INTRODUCTION

According to the World Health Organization (WHO), the definition of menopause is complete stoppage of menstrual cycles due to the loss of follicular function of ovaries.¹ This is a normal physiological process in the life of females and is well-planned that by the end of the menstrual cycles, due to the decreased synthesis of the sex hormones oestrogen and progesterone.^{2,3}

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Estrogen is a group of sex hormone which is necessary for the secondary sexual features as well as the growth and of the reproductive system of females.⁴ These are the three chief endogenous estrogens, which comprise hormonal estrogenic action: estrone (E), estradiol (E2), and estriol (E3). Estradiol is an estrane, is the maximum effective as well as predominant. Estetrol (E4), is another form of oestrogen that is formed during pregnancy.^{5,6} Every steroid hormone drawn-out through the cell membrane and oestrogen have the same mode of action. After entering the cell, they control the expression of many genes through binding and then activating oestrogen receptors (ERs).⁷ Estrogen has the effect of providing cardioprotection by regulating and raising the intensities of HDL-Cs and declining the intensities of LDL-Cs and TGs. This protective effect is diminished after menopause, increasing the possibility of devastating and often lethal CVD complications in postmenopausal women.⁸

The lipid profile should be worse in the women at postmenopause, when it becomes atherogenic, than in the women at premenopause.^{9,10} The amounts of low

density lipoprotein cholesterol (LDL) and total cholesterol (TC) (LDL-C) usually rise after menopause, even though triglycerides (TG) are rising and high density lipoprotein cholesterol (HDL-C) is declining.¹¹

MATERIALS AND METHODS

The study contained two stages. enrollment of subjects in stage 1 and collection of blood samples from participants in stage 2. Subjects were recruited from the Departments of Obstetrics and Gynecology and Medicine OPDs at PMCH Nawabshah based on the criteria of the designed proforma. For this study, all clinical data and pertinent information from each participant were collected by filling out a proforma. All participants gave verbal and written consent after being informed about the study's purpose. A total of 600 participants were involved in this study, which were distributed in to three groups. Group A comprised 200 normal healthy females, group B comprised 200 premenopausal women and group C comprised 200 postmenopausal women.

Patients with existing endocrinal disorders, renal disorder, liver disorder, cardiac disease, hysterectomy and oophorectomy were excluded from the study. Venipuncture of the participants was used to take 5 mL of blood from each participant under aseptic conditions. For the Estrogen, 3 mL of blood remained kept in an EDTA test tube, whereas for the Lipid profile, 2 mL of the blood was collected in the gel test tubes. The blood was centrifuged for 10 minutes at 3500 rpm, fractionated, and conveyed to Ependrof cups before being stored at -20°C until analysis. The material was allowed to reach room temperature before being utilized for the analysis. The COBAS E-411 Roche Hitashi Apparatus was used to estimate Estrogen. A spectrophotometer was used to perform the lipid profile.

This Comparative Cross sectional study is conducted at the Biochemistry Department Peoples University of Medical Health Sciences for Women Nawabshah (PUMHSW) along the cooperation with Gynecology and Obstetrics and Medicine OPD/Ward PMCH. The analysis of the sample had been done at the diagnostic and research laboratory of PUMHSW, Shaheed Benazirabad (SBA).

Sample Technique: Non-probability convenient sampling.

Inclusion Criteria:

- Normal healthy females between ages of 20 to 35 years.
- Pre and postmenopausal females between ages among 40 years to 60 years.
- Pre and postmenopausal females with hypertension.

Exclusion Criteria:

- All the females below 20 years and above age 60 years.

- Patients with existing endocrinal disorders, renal disorder, liver disorder, cardiac disease, hysterectomy and oophorectomy.

Sample Size: Sample size had been designed by means of the Rao software with prevalence of 15.74% premenopausal women and 59.06% postmenopausal women by means of the percentage in 95% of confidential intervals then 5% of margins of errors, the sample size of premenopause stood to be n=204 and postmenopause n=372. Where n1+n2=576. Total 600 participants had been included in present study, divided in to three groups.

$$\text{Formula: } n = \frac{NZ^2 P(1-P)}{d^2 (N-1) + Z^2 P(1-P)}$$

N=Population size

Z= Confidence level or reliability coefficient

P=Prevalence

d=Margin of error

Group A: Comprises of 200 normal healthy women as control group between age group of 20 to 35 years.

Group B: Comprises of 200 premenopausal hypertensive women between age group of 36 years to 50 years.

Group C: Comprises of 200 postmenopausal hypertensive women between age group of 50 years to 60 years.

Tools: Bio data of the participants were taken by filling the self-organized proforma. The proforma contained two parts. Part one contained medical history of each participant. We asked about any presenting complaint, family history, history of smoking, and any genetic disorder in the family. A general physical examination of each participant was also done. In the general physical examination, along with the BP, pulse, and temperature, we also took the anthropometry of each female. Part two contained the gynaecological history of the females. The current menstrual status of a female was asked, and a history of spontaneous and surgical menopause was also taken.

Statistical Analysis Procedure: SPSS (Statistical Package for Social Sciences) Version 22.0 was used to analyze the data. An ANOVA test was applied for comparison among the study groups and a Pearson test for correlation among the groups. Results are presented as means and standard deviations.

RESULTS

In this study, we found that post-menopausal women had significantly higher serum levels of total cholesterol (TC), triglycerides (TG), and LDL cholesterol than pre-menopausal women and normal healthy women (p = 0.001). In comparison to premenopausal women and participants in the normal healthy group, post-menopausal women's HDL-

cholesterol levels were significantly lower (p 0.001). Compared to premenopausal and postmenopausal subjects, normal healthy females had higher levels of HDL cholesterol. Comparing normal healthy ladies to premenopausal and postmenopausal females, the mean values of total cholesterol, triglycerides, and LDL-cholesterol were in normal ranges. The average level of VLDL-cholesterol was observed to differ insignificantly (p=0.223).

In comparison to premenopausal and normal healthy females, postmenopausal females' estradiol concentration was considerably lower (p =0.001). When compared to premenopausal and postmenopausal women, normal, healthy females have higher levels of oestrogen. Estrogen levels had a negative link with TC, TG, LDL, and VLDL while exhibiting a positive correlation with HDL levels.

Table No.1: Comparison of Lipid Profile of Pre and Postmenopausal Females with Normal Healthy Females by Applying ANOVA-Test

Variables	Group-A Normal Healthy Women (n=200)	Group-B Premenopausal Women (n=200)	Group-C Postmenopausal Women (n=200)	p-value
Total Cholesterol (mg/dl)	184.39±33.07	198.68±27.17	200.55±29.29	<0.001
Triacylglycerols (mg/dl)	163.10±38.08	184.22±773.85	196.25±79.36	<0.001
HDL-C (mg/dl)	43.91±2.57	34.91±6.45	34.60±3.97	<0.001
LDL-C (mg/dl)	110.19±30.10	121.98±27.82	113.56±30.10	<0.003
VLDL-C (mg/dl)	37.38±12.12	37.54±15.24	35.56±16.17	<0.223NS

*p<0.05, **p<0.01, ***p<0.001 and NS= Not significant

Table No.2: Estrogen level among the study participants

Variable	Group-A Normal Healthy Women (n=200)	Group-B Premeno- pausal Women (n=200)	Group-C Postmeno- pausal Women (n=200)	p- value
Estradiol (pg/ml)	32.18± 12.20	13.03± 11.42	8.21± 4.7	<0.0 01

DISCUSSION

Studies estimated that lipid profile should be worsen and become atherogenic at the menopausal age of female due to decline estrogen levels. The mean values of Total Cholesterol and Triacylglycerol of postmenopausal women of present study were raised as compared to the premenopause and normal healthy females with highly significant difference of (p<0.001) which was comparable with the Ambikairajah et al¹² study. Kingwell et al estimated that the concentration of HDL-C is significantly lower in menopause than in women with regular menstruation. It's well acknowledged that menopause leads to fluctuations in hormonal status. Ovarian primordial follicle numbers decrease with increasing age resulting from loss of ovarian follicular activity. This clues to reduction in hormone levels especially estrogen which may cause a wide variety of symptoms. The mean values of estrogen concentration of postmenopausal women of present study was decreased as compared to the premenopause and normal healthy females. Soares and Freeman reported in their studies that levels of estrogen decrease with the increasing age of females which is contrast with the present study findings.

CONCLUSION

We concluded in this study that women after the menopause were at high possibility of hypertension and other comorbidities and current study expected to understand the relationship of estrogen level and lipid

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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