Impact of lipoprotein and Basal Metabolic Index on Pre-eclamptic Women

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Abstract

OBJECTIVE: The pre-eclampsia (PE) is common hypertensive and life threatening disorder during pregnancy. Increase concentration of Lipoprotein and Increase basal metabolic index (BMI) are the risk factors for developing per-eclampsia. **METHODOLGY: A** cross sectional, comparative study, conducted in Biochemistry department Liaquat University of Medical & Health Sciences (LUMHS) Jamshoro after approval from Ethical Research committee of LUMHS. Total 100 pregnant women were recruited out of which 50 females were normal healthy women as control, 50 were obese pre-eclamptic women as cases. The subjects were conducted from department of Obstetrics & Gynecology Liaquat University Hospital Jamshoro / Hyderabad, during the period of February 2016 to October 2017. The sampling technique was random sampling. Informed written consent were taken from all participant and collected the sample after taking obstetric history, anthropometric, clinical data and collecting blood sample from volunteers. The lipid profile was evaluated on spectrophotometer and data was entered on Microsoft Excel and SPSS 16.0 (IBM, incorporation, USA). Student t-test was applied for analysis of continuous variables. **RESULTS:** Total cholesterol, triacylglycerol (TAGs), High Density lipoprotein (HDL), low density lipoprotein (LDL) and Very low density lipoprotein (VLDL) in pre-eclamptic patients ($p<0.05$) as compared with control group respectively. The BMI was increases with significant difference of ($p<0.05$) respectively. **CONCLUSION:** The results showed that lipoproteins were increased significantly in pre-eclamptic subjects and high risk factors of developing pre-eclampsia. Early measures can decrease morbidity and mortality in pregnant women.

KEY WORDS: Pre-eclampsia, Lipoprotein, Spectrophotometer

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INTRODUCTION

Pre-eclampsia (PE) is a pregnancy related complication which occurs after 20th, week of pregnancy with systolic blood pressure of 140 mmHg or diastolic blood pressure of 90 mmHg or more, taking two readings six hours, apart accompanied with significant proteinuria 300 mg or more in 24 hours urine collection.[1] Pathogenesis of PE and its causative factors are still unclear. It is thought that PE is developed due to endothelial cell injury, which produced oxidative stress resulting in uncontrolled lipid peroxidation (LPO)[2]. Lipid peroxidation is harmful to the cell membrane because it acts as self-perpetuating reaction which causes abnormal lipid metabolism and excessive cellular activity with placental ischemia.[3]Hormonal changes also alter the lipoprotein during pregnancy usually levels of lipoprotein revert to normal shortly after delivery.[4] Abnormal lipid profile is associated with various disorders like high blood pressure, endothelial dysfunction, decrease in prostaglandin and thromboxane which derived from lipid oxidation.[5]

High density lipoprotein (HDL) transport cholesterol from the blood to the liver.HDL having Paraoxonase 1 enzyme. (PON-1) also

plays significant role in low-density lipoproteins (LDL).[6] It acts as an antioxidant and help in prevention of LDL oxidation. PON-1 enzyme inactivate in LDL by Dephosphorylation and inhibit oxidation, further consequences include damage of tissues and production of free radical results inpro-inflammatory state during pregnancy.[7,13]Circulating LDL is transport cholesterol to cells or tissues.[8] It provides cholesterol for the proper development of membrane biosynthesis but its small and dense particle of LDL are more atherogenic than their counterparts.[8]

Obesity plays an important role in pathogenesis of PE. Obesity is a state of accumulation of excessive body fat. It is measured by height and weight called the body mass index (BMI).[9]According to American college of obstetrics and gynaecology (ACOG) greater than one-half of pregnant women are overweight or obese. Obese female conceives single pregnancy; the recommended weight gain during single pregnancy is 11 to 20 pounds.[10] though many researches recommends that losing or gaining the weight during pregnancy may be increases the risk of premature birth and low weight baby.[11]

A simple screening test is needed to detect preeclampsia and to prevent the mother and foetus from life threatening disease by estimation of serum lipid profile. The aim of the present study was designed to investigate the alteration in lipid profile.

OBJECTIVE OF STUDY: To evaluate and compared the lipoprotein levels and BMI in healthy pregnant women compare with pre-eclamptic women.

SETTING: Present study was conducted in Biochemistry Department, Liaquat University of Medical & Health Sciences, Jamshoro and patients were recruited from indoors and out door Department of Obstetrics & Gynecology, Liaquat University Hospital Jamshoro/Hyderabad.

SAMPLE SIZE: The sample size calculation was done according to general calculation formula. Pre-eclampsia is 5% by using the proportion of 95% confidential interval and 5% margin of error, the sample size calculated was n=80.

Total 100 subjects were recruited and divided into two groups.

Group A: n = 50 Healthy pregnant women with normal B.P after 20th weeks of gestation and **Group B: n = 50** patients with pre-eclampsia after 20th weeks of gestation

STUDY DESIGN: This is Cross-sectional, Comparative study.

STUDY DURATION: Within eight months after approval of study from Ethical Review Committee of LUMHS Jamshoro.

INCLUSION CRITERIA: Healthy pregnant women after 20th weeks of gestation. Pregnant women with pre-eclampsia after 20th weeks of gestation**,** age in between 20- 35 years.

EXCLUSION CRITERIA: Pregnant women below 20 or above 35 years, Multiple Pregnancy Known hypertensive, diabetic, cardiac and renal patients, any liver disease, Smokers. use of drug affecting the lipoprotein and BMI.

METHOD: The study comprised on two phases. Phase 1 was recruitment of pregnant females and phase 2 was collecting blood samples from the all subjects with 12-14 hours fasting. Population informed for the recruitment by the flyers at Department of Obstetrics and Gynaecology, Jamshoro/Hyderabad.

BLOOD PARAMETERS: 03 ml of blood was collected from each participant by venopuncture into vacationers under aseptic measures, collected into EDTA test tube for lipid profile. The blood was centrifuged at 3500 rpm for 5 min by centrifuged machine; the plasma was fractionated and transferred to

eppendrof cups then stored at –20°C till required for analysis. Before the analysis sample was first allowed to attain room temperature then used.

DATA COLLECTION: For this study, all clinical data and relevant details of each participant was registered by filling a Performa or Questionnaire. Verbal and written consent was taken from all participants, explaining them about study purpose.

ETHICAL CONSIDERATION: The study was conducted strictly under the ethical rules after the approval from Ethical Review Committee of LUMHS Jamshoro.

STATISTICAL ANALYSIS PROCEDURE: Data was entered in Microsoft Excel and analyzed on SPSS (Statistical package for Social Sciences) Version 16. Student t-test for comparison between cases and controls was used for continuous variables. Results were presented as mean and standard deviation.

Result: The results of present study were carried out to evaluate the significance of lipid profile in pre-eclampsia and the results are taken as (mean ± SD) summarized in Table-I and II. Total 100 subjects were included in this study, 50 were normotensive pregnant women and 50 patients were having with pre-eclampsia. Maternal age of normal pregnant healthy women was (20.5±6.95) weeks and pre-eclamptic subjects were (26.59±5.16) weeks respectively. Gestational ages of controls and cases were (24.76±6.38) and (24.46±6.35) years respectively, which are insignificant (p> 0.06).Systolic blood pressure in controls were noted as (110.5 ±9.54) mmHg, while in pre-eclamptic it was (195. ±8.59) mmHg showing statistically significant. Diastolic B.P in controls were noted as (70 ± 9.95) mmHg and pre-eclamptic subjects (110 ±6.55) mmHg was highly significant (p < 0.05). The mean BMI, of control group was (22.5±4.95) Kg/m^2 as compared to cases group(31.4±9.5)Kg/m^{2}while showing highly significant (p <0.01)as shown in Table-I respectively.

The mean of serum cholesterol in pre-eclamptic women was significantly high (250.9±25.14) mg/dl as compared to controls (160.5±20.5)mg/dl. The serum TAG-cholesterol was also increased in pre-eclamptic subjects (320 ±23.8)mg/dl as compared to control (117.8 ±11.7) mg/dl, while the serum HDL- cholesterol in cases group was decreased (29.8±5.86)mg/dl as compared to healthy pregnant women (48.9±6.9) mg/dl. On other hand serum LDL-cholesterol significant increases in pre-eclamptic patient (156.6±10.2) mg/dl as compared to control subjects (90.5±11.8) mg/dl. Serum VLDL- cholesterol in cases (35.17±5.5) mg/dl as compared to control group (20.5±4.5)mg/dl. Therefore, the difference was (p<0.01) respectively as presented in Table –II.

Table-1. Comparison of Age, Gestational age, Systolic, Diastolic Blood pressure and anthropometric parameters between controls and cases

VARIABLES	Control (n=50)	Cases (n=50)	p- Value
	Mean ± S.D		
Age (years)	20.5 ± 6.95	26.59 ± 5.16	<0.05*
Gestational Age (Weeks)	24.76 ± 6.38	24.46 ± 6.35	NS 0.06
Systolic B.P (mmHg)	110.5 ± 9.54	195 ± 8.59	< 0.01*
Diastolic B.P (mmHg)	70 ± 9.95	110 ± 6.55	<0.01*
BMI (Kg/m^2)	22.5±4.95	31.5±9.5	<0.01

The values are expressed as mean± standard deviation and units are given in parenthesis. Results are presented as p values and calculated by student t-test *p < 0.05, **p < 0.01

Table-II. Lipid profile in control group and obese pre-eclampticsubjects.

Variables	Control Group (n=50)	Cases Group (n=50)	p-value
	Mean ± SD		
Serum Cholesterol (mg/dl)	160.5 ±20.5	250.9 ± 25.14	<0.01**
Serum Triglycerides (mg/dl)	117.8 ±11.7	320 ±23.8	<0.01**
Serum HDL-Cholesterol (mg/dl)	48.9 ±6.9	29.8 ±5.86	<0.01**
Serum LDL-cholesterol (mg/dl)	90.5 ±11.8	156.6 ±10.2	<0.01**
Serum VLDL-cholesterol (mg/dl)	20.5 ±4.5	35.17 ±5.5	<0.01**

The values are expressed as mean± standard deviation and units are given in parenthesis. Results are presented as p values and calculated by student t-test *p < 0.05, **p < 0.01

Discussion:

The role of lipoprotein in pre-eclampsia had been reported by many researchers. Obesity and dyslipidemia are the factors which are responsible for the development of pre-eclampsia. Lipoproteins are the sources of lipid peroxidation.[12]Leon-Reyes G *et al.*[13] revealed that HDL and LDL on the oxidation due to inactivation of PON-I enzyme and increased concentration of lipoproteins are contribute in developing PE, which support our study results HDL decreases and LDL increases in pre-eclamptic women as compared with normal pregnant females.

Timalsina S*et al.*[14] had reported that total cholesterol, triglyceride, LDL were significantly higher in the preeclamptic cases with paralellay low HDL levels (P<0.01). Support present study results with significant difference of (p <0.01)in pre-eclamptic women as compared to control.

Charlton F *et al.*[15] had reported strong and significant relationship between lipoproteins impact on blood pressure of pre-eclamptic women. As in our study results shows that blood pressure and lipid profile is disturbed in pre-eclamptic patients as compared with control.

Wild R and his co-workers[16] had reported that normally lipoproteins are in optimal rages in healthy pregnant ladies but imbalance occurred in pre-eclampsia. These findings are supporting the present study as well as we observed similar imbalance effects of blood pressure and BMI.

Mrema D*et al.*[17] had reported that females before conceive having normal BMI so, after pregnancy their BMI increases but not more than 25-30Kg/m^2 but pregnant ladies who were overweight before conceive or pre-pregnancy BMI increases up to 40kg/m^2 with high blood pressure. This study is favoring the present study that BMI and blood pressure of pre-eclamptic ladies is high than control grouped.

Poorolajal J et al[18] revealed that overweight and obesity can be considered as a predictor of preeclampsia. This study also supports present study.

CONCLUSION: The observation showed that the BMI and lipid profile was highly significant in pre-eclamptic subjects and the risk factors for developing pre-eclampsia. Early measures can decrease morbidity and mortality in pregnant women.

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