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RESEARCH ARTICLE

STUDY OF MATERNAL LIPID PROFILE IN PREECLAMPSIA

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Preeclampsia, Lipid Profile, Hypertension, Cholesterol, Triglycerides, HDL-Cholesterol, LDL-Cholesterol

Abstract

Introduction: This study evaluates relationship between serum lipid profile and preeclampsia¹.

Objective: The study is to compare the mean lipid levels in pre-eclamptic and normal pregnancy.

Design: This is a descriptive study.

Participants: Among patients attending Out Patient Department in Chalmeda Anand Rao institute of medical sciences, 25 singleton pregnancies diagnosed as having preeclampsia and 25 pregnancies without such diagnosis were included in study.

Outcome measures: Risk of preeclampsia, pregnancy induced hypertension, preterm birth, small/large for gestational age and child loss.

Results: In pre-eclamptic mean triglycerides levels were (254 mg/dl \pm 0.45 versus 116.59 \pm 4.9) significantly higher than normal controls ($p < 0.05$). Mean HDL-Cholesterol levels were (36.92 mg/dl \pm 7.70 versus 51 \pm 5.46) statistically significantly higher than normal controls ($p < 0.05$). Mean LDL-Cholesterol levels were (132.95 mg/dl \pm 32.26 versus 99.36 \pm 17.75) statistically significantly higher in pre-eclamptic as compared to normal controls ($p < 0.05$).

Conclusion: Pre-eclamptic women had deranged lipid profile as compared to normal pregnant women.

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Introduction:-

There has been improvement in antenatal care all round the globe during past few decades. Hypertensive disorders complicating pregnancy is the one of the most common medical problem of pregnancy.² Pre-eclampsia is a serious complication of second half of Pregnancy that occurs with a frequency of 5-10%.³ This disease is a leading cause of maternal morbidity which can lead to maternal death, fetal growth retardation, infant morbidity and mortality.⁴ It is characterized by blood pressure of more than 140/90 mm Hg or rise in systolic blood pressure of more than 30 mmHg or diastolic blood pressure of more than 15 mmHg after 20 weeks of gestation, in combination with proteinuria more than 300 mg/24 hours or greater or equal to 1+ or 100 mg/dl by dipstick response. Triglycerides, Total cholesterol, LDL-Cholesterol concentrations, and TG/HDL-C ratio increased progressively throughout pregnancy; while HDL-Cholesterol amounts are increased from the 1st to the 2nd trimester with a slight decrease in the 3rd trimester. The pathogenesis of preeclampsia is unclear,⁵ however two important components have been identified, trophoblast cells and an accelerated maternal systemic response to trophoblastic tissue.⁶ A two-step model has been described for pathophysiology of preeclampsia.⁷ The first one pertaining to abnormal placentation leading

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to placental ischemia causing secretion of soluble factors that induce endothelial dysfunctioning and maternal preeclampsia⁸ in pregnant women. The second one is related to increase in free radicals and Reactive oxygen species causing cell damage⁹ and increased vascular tonicity causing preeclampsia.¹⁰ It implies that an abnormal lipid profile has a direct effect on endothelial dysfunction leading to decrease in PGI-TxA₂ ratio and subsequent fibrinoid necrosis at uteroplacental implantation site.¹¹ Abnormal lipid profile is associated with atherosclerotic cardiovascular diseases and has a direct effect on endothelial dysfunction. In preeclampsia, hypertension is due to vasospastic phenomenon in kidney, uterus, placenta and brain. In pre-eclamptic women, there is elevated plasma concentration of triglycerides (TG), phospholipids and total lipids and decreased high density lipoprotein – cholesterol (HDL-C) concentrations in comparison with normal pregnancy. Elevated maternal serum lipid concentrations have been related to an adverse intrauterine environment and lead to abnormal birth weight.¹² The present study has been undertaken to compare the changes in lipid profile in normal pregnancy with preeclampsia. Preeclampsia leads to maternal and fetal morbidity and mortality by causing threatening maternal health and fatal viability. Objective of this study is to compare the mean serum level of lipids in pre-eclamptic with normal pregnancy.

Inclusion criteria:

Group A:

Pregnant woman of >20weeks of gestation with Bp:>140/90mmHg noted first time during pregnancy on two occasions at least 4 hours apart with Proteinuria

Group B:

Pregnant women of >20weeks of gestation with normal Blood pressure recordings.

Exclusion criteria:

All pregnant women with following history were excluded from the study:

1. History of chronic hypertension that was present before pregnancy.
2. Women with gestational hypertension
3. History of diabetes mellitus or who are on insulin therapy or hypoglycaemic drugs.
4. Obese women with pre-pregnancy BMI>25kg/m²
5. Those who are taking anti hypertensives or hypolipidemic drugs.
6. Those with diagnosed liver, cardiac or renal diseases or any other major illness.

Statistical Analysis:

Mean and standard deviation was calculated for both preeclamptic and control groups. Descriptive statistics were calculated and is presented as mean \pm standard deviation. Systolic BP, Diastolic BP and lipid levels between preeclamptic and control group were compared using independent sample t-test and p-value <0.05 and was considered statistically significant.

Results:-

Mean age is 29 years and mean gestational age is 36 weeks in preeclamptic and controls. In preeclamptic mean systolic Blood pressure is 154 \pm 0.55 mm Hg, in controls mean systolic Blood pressure is 116 \pm 0.63 mm Hg. In preeclamptic mean diastolic Blood pressure is 102 \pm 0.73 mm Hg, in controls mean diastolic Blood pressure is 69 \pm 0.90 mm Hg. Mean Systolic and diastolic Blood pressure are statistically significantly higher in preeclamptic as compared to controls (p<0.05). Mean cholesterol levels are within normal range in preeclamptic and controls (179.53 mg/dL \pm 7.24 versus 182.44 mg/dL \pm 6.89) and are not statistically significant in preeclamptic as compared to controls (p>0.05). Mean HDL-Cholesterol, levels are (36.92 mg/dL \pm 7.70 versus 51 mg/dL \pm 5.46) statistically significantly lower in preeclamptic as compared to normal controls (p<0.05). Mean LDL-Cholesterol levels are (132.95 mg/dL \pm 32.26 versus 99.36 mg/dL \pm 17.75) statistically significantly higher in preeclamptic as compared to normal controls (p<0.05). Mean triglycerides levels are (254 mg/dL \pm 0.45 versus 116.59 mg/dL \pm 4.9) statistically significantly higher in preeclamptic as compared to normal controls (p<0.05).

Table 1:- American Association of Clinical Endocrinologists' Guidelines for management of Dyslipidemia and prevention of Atherosclerosis Optimal/Near-optimal, Borderline and High-Risk serum lipid concentrations

Lipid	Optimal/near-optimal serum concentration	Borderline serum concentration	High-risk/very high-risk serum concentration
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TC,mg/dL	<200	200-239	> 240
HDL-C,mg/dL	> 60(negative risk factor)	50-59	<50
LDL-C,mg/dL	<100 optimal (100-129 near-optimal)	130-159	160-189 high > 190 very high
TG,mg/dL	<150	150-199	200-499 high > 500 very high

Abbreviations: HDL-C,high-density lipoprotein cholesterol;LDL-C,low-density lipoprotein cholesterol;TC , total cholesterol; TG , triglycerides.

Table 2:- Blood pressure and lipid profile of cases and controls.

Clinical parameters	Pre eclamptic	Controls	P values
Systolic Bp	154 ± 0.55	116 ± 0.63	<0.05
Diastolic Bp	102 ± 0.73	69 ± 0.90	<0.05
Total cholesterol,mg/dl	179.53 ± 7.24	182.44 ± 6.89	>0.05
HDL-C,mg/dl	36.92 ± 7.70	51 ± 5.46	<0.05
LDL-C,mg/dl	132.95 ± 32.26	99.36 ± 17.75	<0.05
Triglycerides	254 ± 0.45	116.59 ± 4.9	<0.05

Discussion:-

Hypertensive disorders during pregnancies, especially preeclampsia, are a pregnancy-specific disorder that affects 3-5% of pregnant women . Preeclampsia is a hypertensive disorder associated with severe maternal and neonatal morbidity and mortality. Therefore, pregnant women at high risk of developing preeclampsia or severe preeclampsia should be identified as soon as possible to avoid adverse pregnancy outcomes. Classically, the condition presents with new-onset hypertension and proteinuria after 20 weeks of gestation. This descriptive study is designed to evaluate blood serum levels cholesterol, lipoproteins, and triglycerides of pregnant preeclamptic women as lipid levels change substantially during gestation. **The preeclampsia group had a significant rise in Triglyceride (TG) and VLDL-C levels and decreased HDL-C levels as compared to the control group.** Although it is still unclear whether hypertriglyceridemia becomes a risk factor for preeclampsia or whether there is any causal association between them, high triglyceride levels seem to increase the risk of placental vascular disorders which trigger endothelial dysfunction, atherosclerosis and thrombosis. The development of atherosclerosis in the placental spiral arteries of preeclamptic women indicates that elevated levels of triglycerides are involved in this disorder. The principle modulator of this hypertriglyceridemia is estrogen as pregnancy is associated with hyper-oestrogenaemia. Estrogen induces hepatic biosynthesis of endogenous triglycerides, which is carried by VLDL. This process may be modulated by hyperinsulinism found in pregnancy. Moreover, this hypertriglyceridemia may be associated with hypercoagulability. Hypertriglyceridemia could also be involved in the pathogenesis of hypertensive disorders during pregnancy. It is also suggested that triglyceride assessment between 28 and 32 weeks could be a predictive of preeclampsia.

Conclusion:-

In Preeclamptic women, there is deranged lipid profile due to abnormal lipid metabolism. High blood pressure, Increased triglyceride levels and delayed triglycerides clearance and are the grounds for the development of preeclampsia. This relationship may be significant in understanding the pathological process of pre-eclampsia and might help in developing strategies for prevention and early diagnosis of pre-eclampsia. Future studies on hypertriglyceridemia and preeclampsia associations might prove valuable information in understanding its pathophysiology and the development of preventive and therapeutic strategies that allow close vigilance and easy referral for the pregnant women at risk that subsequently improves health of the community.

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