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A Cross-Sectional Study of Association of Dyslipidaemia with Preeclampsia

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Abstract

Background: Dyslipidemia is a silent factor that leads life towards a life threatening condition by hypertension. Preeclampsia is one of the commonest obstetrical emergencies. Most of the women in pregnancy are victim of this hypertensive complication.

Objective: To find out the association of dyslipidemia with pre-eclampsia.

Methods: This study was conducted in Department of Obstetrics & Gynecology of Sir Salimullah Medical College and Mitford Hospital for one-year period after approval of proposal. The sample size was 100. As it was a cross sectional comparative study 50 patients were pre eclamptic (Case) who and 50 subjects were normotensive (Control) pregnant mothers. All participants were informed detailed regarding the study and informed written consent was taken. Total cholesterol, HDL, LDL and TG were determined. The mean of each lipid category were compared using unpaired t test and presented as Mean \pm SD.

Results: Mean age of the preeclampsia patient was 27.06 ± 4.59 years and normotensive pregnant women was 25.72 ± 4.76 years. Serum cholesterol (263.76 ± 72.27 mg/dl), LDL (161.91 ± 60.24 mg/dl vs 119.65 ± 21.78 mg/dl) and triglyceride (279.50 ± 117.84 mg/dl vs 169.40 ± 41.94 mg/dl) were significantly higher in preeclamptic patients than normotensive pregnant women.

Conclusion: Total cholesterol, LDL and triglyceride were elevated in preeclamptic patients when compared to normotensive pregnant women.

Keywords: Lipid profiles, preeclampsia, cholesterol

Introduction

Pregnancy induced hypertension (PIH) is a hypertensive disorder in pregnancy that occurs after 20 weeks of pregnancy in the absence of other causes of elevated blood pressure (BP) ($\geq 140/90$ mm of Hg measured 2 times with at least of 6h interval). When PIH is associated with significant proteinuria (protein in urine ≥ 0.3 g/in 24 h) it is termed as preeclampsia. So the cardinal clinical features of the condition are hypertension and proteinuria occurring after 20 weeks gestation in women who were not previously known to be hypertensive. Other signs and symptoms include edema and headache, and in severe cases, the condition is associated with seizures (eclampsia), liver, and kidney dysfunction as well as clotting abnormalities, Adult Respiratory Distress Syndrome and fetal growth restriction (FGR) [1]. Pre-eclampsia is a major cause of morbidity and mortality for the woman and her child. Globally, each year more than four million women develop pre-eclampsia and approximately 100,000 women will have eclamptic convulsion with over 90% occurring in developing countries [2]. It results in 12% of maternal deaths globally, up to 40% of maternal death in some countries and is responsible for occurrence of up to 13% of still births and 20% of early neonatal deaths [3]. Approximately 10-15% of maternal deaths in developing countries are associated with preeclampsia leading to eclampsia [4]. There is no concrete data found on incidence of preeclampsia in our country, but calculated from the US Census Bureau, International Data Base, 2004, the extrapolated annual incidence of preeclampsia in Bangladesh is 76,032. Our neighbouring country, India has the incidence of preeclampsia, as recorded from hospital statistics, varying widely from 5 to 15% [5]. Bangladesh, the most densely populated country in South East Asia has high maternal mortality as well as fetal mortality rate. According to WHO severe preeclampsia accounts for 16.1% of maternal deaths in developed countries over the past 2 decades [6]. Pre-eclampsia is a multiorgan disease process of unknown aetiology characterized by the development of hypertension and proteinuria after 20 weeks of gestation. Delivery is the only cure for pre-eclampsia.

The association of alteration in serum cholesterol, triglycerides and HDL-C in essential hypertension is well documented. Various studies claim that abnormal lipid synthesis leading to increase of thromboxane level and the decrease of prostaglandin levels as well as then imbalance of lipid peroxidase and antioxidants is responsible for preeclampsia [7]. The characteristic preeclampsia uteroplacental lesion is similar to atherosclerotic lesions; both display vessel wall necrosis and accumulation of lipid laden foam cells, a hallmark of oxidized low-density lipoproteins (LDL) [8].

Materials and Methods

Study Design: This study was designed as a cross-sectional study.

Place of Study: Department of Obstetrics and Gynaecology, Sir Salimullah Medical College & Mitford Hospital, Dhaka, Bangladesh.

Study Period: This study was conducted from November 2018 to October 2019 for a period of one year.

Study population: Patients with preeclampsia patients admitted at the Department of Obstetrics and Gynaecology, Sir Salimullah Medical College & Mitford Hospital, Dhaka during the study period.

Inclusion criteria

- Women aged between 18-30 years
- Women in 3rd trimester of pregnancy
- Mothers with pre-eclampsia features (Group-A)
- Mothers with normotensive pregnancy (Group-B)

Exclusion criteria

- Pre-existing diabetes mellitus.
- Pre-existing hypertension
- Preexisting hyperlipidemia (before 20 weeks of pregnancy)
- Edema, proteinuria, oliguria, hepatic disease, involvement of other organs.

Sample size: Finally, 100 samples were taken in this study.

Study Procedure: This cross sectional comparative study was done among the patients of third trimester attending in the Department of Obstetrics & Gynecology of Sir Salimullah Medical College and Mitford Hospital, Dhaka. Here the patients were enrolled by purposive sampling of 3rd trimester of pregnancy with and without pre-eclampsia. Mothers who had pre-eclampsia categorized as Group-A, whereas the counterpart were categorized as Group-B. All mothers were explained regarding the study procedure and they were ensured that enrollment in this study will not result in any benefit or loss in their treatment procedure. But the study results would help to modify treatment procedure for the future mothers who will take healthcare service in this hospital. Thereafter total cholesterol was determined by enzymatic method in autoanalyzer, Triglycerides was determined by GPO-PAP method, HDL was determined by phosphotungstic acid method, VLDL was determined by TG/5 and LDL was determined by Friedewald equation [LDL = TC-(HDL+TG/5)]. Data regarding socio-demographic, clinical and biochemical were recorded.

Statistical Analysis: Computer based statistical analysis were carried out with appropriate techniques and systems with the

help of professional statistician. All data were recorded systematically in preformed data collection form (questionnaire) and quantitative data were expressed as mean and standard deviation and qualitative data were expressed as frequency distribution and percentage. Statistical analysis was performed by using window based computer software devised with Statistical Packages for Social Sciences (SPSS-22). 95% confidence limit was taken. The summarized data was interpreted accordingly and was then presented in the form of tables.

Results

This cross-sectional study was conducted at the Department of Obstetrics and Gynaecology, Sir Salimullah Medical College & Mitford Hospital, Dhaka over a period of six months starting from December 2018 to May 2019 to see the association of hyperlipidemia with pre-eclampsia. The results are as follows:

Table 1: Baseline and demographic characteristics of the study patients (N=100)

Age (years)	Preeclampsia	Control	p-value
19 - 23	13 (26.0)	23 (46.0)	0.155
24 - 28	14 (28.0)	11 (22.0)	
29 - 33	19 (38.0)	13 (26.0)	
34 - 36	4 (8.0)	3 (6.0)	
Mean ± SD	27.06±4.59	25.72±4.76	
Educational status			
Illiterate	12 (24.0)	0 (0.0)	0.001
Primary	11 (22.0)	22 (44.0)	
SSC	23 (46.0)	21 (42.0)	
HSC	4 (8.0)	7 (14.0)	
Occupation			
Housewife	41 (82.0)	40 (80.0)	0.514
Service holder	5 (10.0)	3 (6.0)	
Students	4 (8.0)	7 (14.0)	
Residence			
Urban	15 (30.0)	19 (38.0)	0.398
Rural	35 (70.0)	31 (62.0)	
Associated medical disorder			
Diabetes	4 (8.0)	0 (0.0)	
Renal disease	0 (0.0)	4 (8.0)	
Others	0 (0.0)	4 (8.0)	
Past history			
GDM	4 (8.0)	0 (0.0)	0.005
Pre-eclampsia	6 (12.0)	0 (0.0)	
Still birth/IUD	7 (14.0)	4 (8.0)	
Family history			
Diabetes	23 (46.0)	0 (0.0)	<0.001
Hypertension	9 (18.0)	16 (32.0)	

Unpaired t test was done to measure the level of significance

Table 1 shows distribution of the study subjects according to age. Mean age of the preeclampsia patient was 27.06±4.59 years and normotensive pregnant women were 25.72±4.76 years. All normal pregnant women were literate but 24.0% of the preeclampsia patients were illiterate. Most of the preeclamptic patients and normotensive pregnant women were housewife. Most of the preeclamptic patients and normotensive pregnant women were from rural area. Table 1 shows distribution of the study subjects according to associated medical disorder. Among preeclamptic patients, 8.0% had GDM, 12.0% had pre-eclampsia and 14.0% had still birth/IUD but among normotensive pregnant women 8.0% had still birth/ IUD. 46.0% preeclamptic patient had family history of diabetes and 18.0% had family history of hypertension. Among normotensive pregnant women, 32.0% had family history of hypertension.

Table 2: Clinical findings of study subjects (n=100)

Clinical findings	Preeclampsia	Control	p-value
Oedema			
+	8 (16.0)	11 (22.0)	<0.001
++	31 (62.0)	4 (8.0)	
+++	9 (18.0)	0 (0.0)	
Anemia	41 (82.0)	22 (44.0)	<0.001
Tingling numbness	16 (32.0)	0 (0.0)	<0.001
GHTN	20 (40.0)	8 (16.0)	0.008
GDM	6 (12.0)	0 (0.0)	0.027
Oligohydramnios	27 (54.0)	0 (0.0)	<0.001
IUGR	12 (24.0)	0 (0.0)	<0.001
Systolic BP	163.40±26.00	114.80±12.97	<0.001
Diastolic BP	103.00±13.59	76.40±10.64	<0.001

Unpaired t test was done to measure the level of significance, Chi-square test was done to measure the level of significance

Table 2 shows clinical findings of the study subjects. Oedema, systolic blood pressure and diastolic blood pressure was significantly higher in preeclamptic patients than normotensive pregnant women. Anemia, tingling numbness, GHTN, GDM, oligohydramnios and IUGR was significantly higher in preeclamptic patients than normotensive pregnant women.

Table 3: Obstetric history of study subjects (n=100)

Obstetric history	Preeclampsia	Control	p-value
Married for (years)	6.34±5.15	4.68±3.95	0.073
Gestational age (weeks)	33.29±1.80	34.23±1.11	0.004
Parity			
Primipara	33 (66.0)	40 (80.0)	0.115
Multipara	17 (34.0)	10 (20.0)	

Unpaired t and Chi-square test was done to measure the level of significance

Table 3 shows obstetric history of the study subjects. Gestational age was significantly lower in preeclamptic patients than normotensive pregnant women.

Table 4: Lipid profile of study subjects (n=100)

Lipid profile	Preeclampsia	Control	p-value
Serum cholesterol	263.76±72.27	201.36±17.53	<0.001
HDL	52.56±17.20	51.96±13.02	0.843
LDL	161.91±60.24	119.65±21.78	<0.001
Triglycerides	279.50±117.84	169.40±41.94	<0.001

Unpaired t test was done to measure the level of significance

Table 4 shows lipid profile of the study subjects. Serum cholesterol, LDL and triglyceride were significantly higher in preeclamptic patients than normotensive pregnant women.

Discussion

Preeclampsia still remains as one of the most serious complications of pregnancy and the pathophysiology of the disease is not clearly understood. The possible involvement of genetic and immune mechanism in the etiology of preeclampsia has been increasingly attracting attention. Damage from free radicals has been implicated in many pathological conditions, and the activity of free radicals may increase during pregnancy and preeclampsia. This study included 50 preeclamptic pregnant women and 50 normotensive pregnant women. Mean age of the preeclampsia patient was 27.06±4.59 years and normotensive pregnant women were 25.72±4.76 years. There was no significant difference between the two groups. In the study of

Kanmani and Sudha *et al* [9], Mean age of the preeclamptic patient was 27.2±4.9 years. In this study, 26.0% preeclamptic patients were in age group 19-23, 28.0% in 24-28 years, 38.0% in 29-33 years and 8.0% in 34-36 years age group. In the study of Thathagari and Kumar *et al*. [10], 50.0% preeclamptic patients were in age group 18-25 years, 29.1% in 26-30 years and 20.9% in 31-35 years age group. In this study, among preeclamptic patients, 66.0% were primipara and 34.0% were multipara. Kanmani and Sudha *et al*. [9] found primipara 59.25% and multipara 40.75%. Thathagari and Kumar *et al*. [10] found primipara 65.5% and multipara 34.5%. In this study serum cholesterol was significantly higher in preeclamptic patients than normotensive pregnant women (263.76±72.27 mg/dl vs 201.36±17.53 mg/dl). This study result consisted with the results of Thathagari and Kumar *et al*. [10], Kanmani and Sudha *et al* [9] Yadav *et al*. [11] and Vani *et al*. [12] they found significant higher level of total cholesterol in preeclamptic patients than normotensive pregnant women in their respective studies. In this study LDL was significantly higher in preeclamptic patients than normotensive pregnant women (161.91±60.24 mg/dl vs 119.65±21.78 mg/dl). Thathagari and Kumar *et al*. [10], Kanmani and Sudha *et al*. [9], Yadav *et al*. [11] and Vani *et al*. [12] found significant higher level of LDL in preeclamptic patients than normotensive pregnant women in their respective studies. In this study triglycerides was significantly higher in preeclamptic patients than normotensive pregnant women (279.50±117.84 mg/dl vs 169.40±41.94 mg/dl). This study result consisted with the results of Thathagari and Kumar *et al*. [10] Kanmani and Sudha *et al*. [9], Yadav *et al*. [11], Vani *et al*. [12] and Ray *et al*. [13], they found significant higher level of triglyceride in preeclamptic patients than normotensive pregnant women in their respective studies. In this study insignificant difference was found in HDL between the two groups (52.56±17.20 mg/dl vs 51.96±13.02 mg/dl). This study result regarding HDL was inconsistent with the study results of Thathagari and Kumar *et al* [10] Kanmani and Sudha *et al*. [9], Yadav *et al*. [11] and Vani *et al*. [12]. In their study there was a significant decrease in HDL-C in the study group compared to controls.

Conclusion

According to this study finding, it can conclude that preeclamptic women have altered levels of serum lipid profile when compared to normotensive pregnant women. Hence, early detection of these parameters is going to help in better management of preeclampsia cases which is important to improve the maternal and fetal outcome.

Limitation of the study

The limitation of this present study is:

1. Study was done in a single center.
2. Sample size is small.

Recommendations

- Further large scale study should be conducted.
- Multi centered study should be done.

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Author's Contribution: Not available.

Conflict of Interest: Not available.

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