

Frequency of Pregnancy Induced Hypertension in pregnant patients presenting in a tertiary care hospital and Comparison of Serum Lipid Profile in Normotensive and Hypertensive Pregnant Women

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ABSTRACT

Background: Hypertension is the commonest medical disorder encountered during pregnancy with a reported frequency of 9.8% in general population. Though the exact cause is not yet known, a lot of factors have been found associated with pregnancy induced hypertension. One such factor is maternal serum dyslipidemia. However, in most of the previous studies, there was doubt about the possible association between maternal serum dyslipidemia and pregnancy induced hypertension.

Aim: To determine the frequency of pregnancy induced hypertension among pregnant women visiting a tertiary care facility and to compare the serum lipid profile in normotensive and hypertensive pregnant women.

Methods: This was a descriptive cross-sectional study conducted at the Obstetrics and Gynaecology department of Lahore Medical and Dental college and Ghurki trust teaching hospital, Lahore, between 1/01/2017 to 30/06/2017. 200 patients who presented in the outpatient's department and fulfilled the inclusion criteria were included in this study after taking an informed written consent. Known hypertensive patients and those with underlying vascular disease were excluded.

Results: The results showed that 23(11.5%) patients were hypertensive while majority (88.5%) of the patients were normotensive. There was significant difference among the two groups in terms of serum triglycerides (163.70±15.11 vs. 108.59±7.84 mg/dl; p=0.000), total cholesterol (192.83±13.13 vs. 148.89±5.821 mg/dl; p=.001), LDL (133.40±10.10 vs. 73.56±2.26 mg/dl; p=0.000), VLDL (113.55±9.01 vs. 48.63±2.72 mg/dl; p=0.000) and HDL (37.41±1.85 vs. 52.54±1.63 mg/dl; p=.033).

Conclusion: Pregnancy induced hypertension is quite frequent among pregnant women and there is significant association between maternal serum dyslipidemia (raised triglycerides, total cholesterol, LDL, VLDL and reduced HDL) and pregnancy induced hypertension.

Keywords: Pregnancy Induced Hypertension, Lipid Profile, Cholesterol

INTRODUCTION

Hypertension is the most common medical disorder experienced during pregnancy and it complicates up to 10% of all pregnancies¹. Normal pregnancy is characterized by essential changes in lipid metabolism. There is significant deposition and hypertrophy of maternal adipocytes along with increased expression of insulin receptors so that glucose is available to meet the demands of the growing fetus. Increased maternal insulin leads to increased production of lipids which are then transported across the placenta for the growth of the fetus². Triglycerides, total cholesterol and HDL rise during normal pregnancy but revert to normal levels after pregnancy. These changes are non-atherogenic^{2,3}.

Dyslipidemia is more marked in patients who develop hypertension later during pregnancy³. Dyslipidemia and hypertension are significant risk factors which may predispose these women to future cardiovascular diseases^{5,6}. Though known for a long time, only a little is known about its pathogenesis and prevention⁷. The primary concern in such pregnancies is the threat to the mother and

the foetus which can range from being trivial to life threatening sometimes⁸.

Though the exact cause is not known; a lot of factors have been found associated with gestational hypertension which include primi-gravidity, multiple gestations, molar pregnancy, pregnancy induced hypertension in previous pregnancy and underlying vascular diseases like diabetes, hypertension and lupus (SLE)^{9,10}. Frequency of PIH in one study is 8.9% in pregnant women¹⁴.

Several studies have identified proatherogenic patterns of dyslipidemia that occur before hypertension develops. Anjum et al. in 2013 showed that in women with gestational hypertension, there were elevated levels of Serum Triglycerides (161.02±3.58 vs. 105.31±8.53; p=0.010), Total Cholesterol (188.90±4.11 vs. 152.45±1.99; p=0.162), Low Density Lipoproteins (LDL; 136.50±3.17 vs. 70.48±2.14; p=0.000) and Very Low Density Lipoproteins (VLDL; 117.06±1.05 vs. 41.06±1.70; p=0.034) and reduced levels of High Density lipoproteins (HDL; 49.41±1.56 vs. 37.16±1.64; p=0.012) as compared to normotensive pregnant women⁹. Kaloti et al. in 2013 acquired similar results and showed elevated levels of serum lipids; triglycerides (294.25±7.24 vs. 212.30±7.28; p=0.001), total cholesterol (213.25±3.14 vs. 188.23±4.6; p=NS), LDL (111.15±2.91 vs. 93.42±4.07; p=NS), VLDL (58.74±1.44 vs.

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42.22±1.46; p=0.001) and reduced levels of serum HDL (43.45±0.58 vs. 52.20±1.14; p=0.001) in pregnant women with pregnancy induced hypertension as compared to normal pregnant women¹¹. Pushparaj in 2012 found that total cholesterol, triglycerides, LDL-C, VLDL-C were significantly elevated and HDL-C was significantly decreased in preeclampsia group compared to control (p<0.0001)⁶.

However, Irinyenikan et al. in 2013 observed no such association. He acquired statistically insignificant differences in triglycerides (151.8±47.1 vs. 146.6±49.2; p=0.482), total cholesterol (183.8±41.5 vs. 175.9±44.0; p=0.562), LDL (123.9±34.3 vs. 109.1±42.0; p=0.086) and VLDL (36.0±39.8 vs. 29.5±10.1; p=0.352) except for HDL (28.2±9.2 vs. 35.2±11.2; p=0.001) among hypertensive and normotensive pregnant women¹². Punthumapol and Kittichotpanich in 2008 also observed no association between maternal serum lipid profile and pregnancy induced hypertension¹³.

Doubt thus exists about the possible role of deranged maternal serum lipid profile in pregnancy induced hypertension. The purpose of this study was therefore to know about the magnitude of this disease in our population and to confirm the dyslipidemia in hypertensive pregnancies. It would enable early identification of women who are more prone to PIH by doing maternal serum lipid profile on antenatal visits so that measures can be taken to control it, thus reducing the risk of pregnancy induced hypertension and its complications in future.

The objectives of this study were to determine the frequency of PIH in pregnant women presenting in a tertiary care hospital and to compare the serum lipid profile in normotensive and hypertensive pregnant women.

METHODS

This was a descriptive cross-sectional single-centre study conducted at the Obstetrics and Gynaecology department of Lahore Medical and Dental college and Ghurki trust teaching hospital, Lahore between 1/01/2017 to 30/06/2017. 200 patients who presented in the outpatient's department and fulfilled the inclusion criteria were included in this study after taking a written informed consent. Patients were selected by non-probability purposive sampling according to the following inclusion and exclusion criteria;

Inclusion criteria: Pregnant women aged 18-32 years with gestational age of 28-32 weeks (as per dating scan).

Exclusion criteria

1. Pregnant women with multiple gestations or molar pregnancy as per ultrasound examination.
2. Pregnant women with history of pregnancy induced hypertension in previous pregnancy.
3. Pregnant women with underlying vascular diseases like diabetes, hypertension and lupus as per history and clinical record of the patient.

Detailed history was taken from each patient. The maternal blood pressure was monitored and patients with

PIH were identified. The patients were then divided into two groups; normotensives and those with PIH. The serum lipid profile of patients from both groups was done. Patient's demographic data as well as blood pressure recordings and serum lipid profile were noted and recorded into a predesigned proforma. All the blood pressure readings were taken on a single apparatus by the same doctor and all the tests were acquired from the same machine and the same laboratory to eliminate bias. Confounding variables were controlled by exclusion.

The collected data was entered into SPSS version 21. The numerical variables i.e., age, gestational age, blood pressure readings and serum lipid profile have been presented by mean±sd. T-test was used for comparison of quantitative variables i.e., mean values of serum lipid profile in both groups.

Categorical variable i.e., parity, PIH has been presented by frequency and percentage. A p-value of ≤0.05 has been considered statistically significant.

RESULTS

The age of the patients ranged from 18 years to 32 years with a mean age of 26.87±2.81 years while the gestational age of the patients ranged from 28-32 weeks with a mean of 29.65±1.43 weeks. Most (57%) of the patients were para 1 followed by para 2 in 31% cases. The systolic blood pressure of the patients ranged from 110 mmHg to 165 mmHg with a mean of 124.20±12.85 mmHg while the diastolic BP of the patients ranged from 70 mmHg to 110 mmHg with a mean of 79.98±7.27 mmHg as shown in table 1. The patients were classified as hypertensive and normotensive depending upon blood pressure readings. 23 (11.5%) patients were hypertensive while majority (88.5%) of the patients were normotensive as shown in table 2. These two groups were then compared in terms of age and gestational age. The mean age of the patients was 27.61±4.37 years among hypertensives and 26.77±2.54 years among normotensives, however the difference was statistically insignificant (p=0.181). Similarly, the mean gestational age was 29.22±1.31 weeks among hypertensives and 29.71±1.44 weeks among normotensives, yet the difference was again statistically insignificant (p=0.124). However, there was significant difference among the two groups in terms of systolic blood pressure (151.30±8.00mmHg vs. 120.68±8.38mmHg; p=0.000) and diastolic blood pressure (94.78±5.10mmHg vs. 78.05±4.92mmHg; p=0.000) as shown in table 3.

There was also significant difference among the two groups in terms of serum triglycerides, total cholesterol, LDL, VLDL and HDL as shown in table 4

1. Triglycerides (163.70±15.11 vs. 108.59±7.84 mg/dl; p=0.000).
2. Total cholesterol (192.83±13.13 vs. 148.89±5.821 mg/dl; p=.001).
3. LDL (133.40±10.10 vs. 73.56±2.26 mg/dl; p=0.000).
4. VLDL (113.55±9.01 vs. 48.63±2.72 mg/dl; p=0.000).
5. HDL (37.41±1.85 vs. 52.54±1.63 mg/dl; p=.033).

Table 1: Descriptive Statistics for Blood Pressure

	N	Minimum	Maximum	Mean	Std. Deviation
Systolic BP	200	110	165	124.20	12.852
Diastolic BP	200	70	110	79.98	7.272
Valid N (list wise)	200				

Table 2: Frequency table for pregnancy induced hypertension

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	11.5	11.5	11.5
	No	177	88.5	88.5	100.0
	Total	200	100.0	100.0	

Table 3: Comparison of groups in terms of systolic and diastolic BP

	Pregnancy Induced Hypertension	N	Mean	Std. Deviation	Std. Error Mean	P value
Systolic B.P	Yes	23	151.30	8.008	1.670	.000
	No	177	120.68	8.383	.630	
Diastolic B.P	Yes	23	94.78	5.108	1.065	.000
	No	177	78.05	4.916	0.369	

Table 4: Comparison of groups in terms of serum triglycerides, serum total cholesterol, Serum LDL, Serum VLDL and Serum HDL

	Pregnancy Induced Hypertension	N	Mean	Std. Deviation	Std. Error Mean	P value
Serum Triglycerides	Yes	23	163.70	15.110	3.151	.000
	No	177	108.59	7.841	.589	
Serum Total Cholesterol	Yes	23	192.83	13.130	2.738	.001
	No	177	148.89	5.821	.437	
Serum LDL	Yes	23	133.40	10.100	2.106	.000
	No	177	73.56	2.263	.170	
Serum VLDL	Yes	23	113.55	9.016	1.880	.000
	No	177	48.63	2.721	.204	
Serum HDL	Yes	23	37.41	1.850	.385	.033
	No	177	52.54	1.630	.122	

DISCUSSION

Hypertension is a common medical disorder experienced during pregnancy as depicted in our study (frequency of PIH 11.3%). It complicates 6-12% of all pregnancies in America¹⁵. It is associated with increase in free fatty acids and deranged lipid profile due to derangement in lipoprotein metabolism^{2,3}. The pattern of dyslipidemia seen in preeclampsia may put these women to risk of developing cardiovascular diseases in future⁴.

Association of pregnancy induced hypertension with maternal serum dyslipidemia had been investigated in a number of national and international studies, yet the evidence was not conclusive because of conflicting results among various authors.

The purpose of the current study was to settle this conflict and confirm whether or not maternal serum dyslipidemia is associated with PIH. It was observed that the frequency of PIH was 11.3%. The results of this study match with those of Nisar et al. who observed this frequency to be 9.8%.¹⁴ In this study, it was observed that hypertensive women had raised levels of serum triglycerides (163.70±15.11 vs. 108.59±7.84mg/dl; p=0.000), total cholesterol (192.83±13.13 vs. 148.89±5.821mg/dl; p=.001), LDL (133.40±10.10 vs. 73.56±2.26mg/dl; p=0.000), VLDL (113.55±9.01 vs. 48.63±2.72mg/dl; p=0.000) and HDL (37.41±1.85 vs. 52.54±1.63mg/dl; p=.033) as compared to normotensives and in all these cases the difference was statistically significant (p≤.05). The results of this study among normal pregnant women match with those of Faryal et al. who showed these levels to be; serum total cholesterol (177.9±40.8mg/dl), serum triglycerides (129.1±27.7mg/dl), Serum HDL (53.1±7.6mg/dl) and Serum LDL (130.0±14.9 mg/dl)²¹.

The results of this study among the two groups agree with the other authors in the basic theme that maternal serum dyslipidemia is associated with PIH.

5,6,10,11,16,18,20 However, the results match closely with those of Anjum et al. (Pakistan)⁹ and Irinyikan et al. (Nigeria) as far as values for serum levels are concerned. Nazli et al.¹⁶ and Kalar et al.¹⁸ in Pakistan also observed similar association, however the levels documented by them are quite high as compared to our study.

Thus there is significant association between maternal serum dyslipidemia (raised serum triglycerides (163.70±15.11 vs. 108.59±7.84 mg/dl; p=0.000), Total cholesterol (192.83±13.13 vs. 148.89±5.821 mg/dl; p=.001), LDL (133.40±10.10 vs. 73.56±2.26 mg/dl; p=0.000), VLDL (113.55±9.01 vs. 48.63±2.72 mg/dl; p=0.000) and reduced HDL (37.41±1.85 vs. 52.54±1.63 mg/dl; p=.033)) and pregnancy induced hypertension.

Nisa et al. in 2011²² documented high gestation lipid profile among Pakistani pregnant women. Thus, in the light of this study, great emphasis should be made on pre-natal counseling of mothers. Once they are aware of the morbidity and mortality associated with pregnancy induced hypertension and its sequel, active measures can be incorporated in the form of dietary modifications and treatment after mothers with high lipid profile are detected. This can help to persuade women to adopt healthy and active lifestyles so as to minimize such risks in future.

CONCLUSION

Pregnancy induced hypertension is quite frequent among pregnant women and there is significant association between maternal serum dyslipidemia (raised triglycerides, total cholesterol, LDL, VLDL and reduced HDL) and pregnancy induced hypertension. Serum triglycerides and lipid profile is a neglected investigation and is not routinely carried out in pregnancy. If this investigation is included in routine investigations list in pregnant patients, pregnancy induced hypertension and its complications can be effectively managed and even prevented. Furthermore, we need more studies in this area so that pregnancy induced

hypertension can be controlled and patients' cardiovascular risks can be minimized in future.

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