



COMPARATIVE ANALYSIS OF SERUM LIPID PROFILE BETWEEN NORMOTENSIVE AND HYPERTENSIVE PREGNANT WOMEN

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ABSTRACT

Pregnancy-induced hypertension (PIH) is one of a major cause of maternal mortality. Serum lipid profile plays pivotal role in the regulation of normal blood pressure during pregnancy. The aim of our study was to evaluate the alteration of serum lipid profile during normotensive and hypertensive pregnancy. This case-control study was conducted among the pregnant women. Total 200 participants were evaluated out of which 50 were normotensive pregnant women (28 ± 8 years) taken as a normal control group and 150 were enrolled as hypertensive (30 ± 6 years) study group. Average blood pressure for normotensive pregnant women was 115/75 whereas, for hypertensive pregnant women it was 148.45/95.40. Hypertension was directly associated with increased levels of serum TGs (161.02 ± 3.58 vs. 105.31 ± 8.53), TC (188.90 ± 4.11 vs. 152.45 ± 1.99), LDL (136.50 ± 3.17 vs. 70.48 ± 2.14) and VLDL (117.06 ± 1.05 vs. 41.06 ± 1.70), and fall in HDL (49.41 ± 1.56 vs. 37.16 ± 1.64) as compared to that of normotensive pregnant women. The increased levels of TGs, TC, and LDL and also increased values of TC/HDL, TGs/HDL and LDL/HDL in hypertensive pregnant women. Results of our study, it can be concluded that lipid profile plays their critical role in regulating blood pressure during pregnancy. Increased levels of TC, TGs, LDL and VLDL induced hypertension, whereas, HDL regulated the blood pressure to normal levels. This association may be significant in understanding the development of hypertension during pregnancy and may help in developing the strategies for prevention and treatment of PIH.

KEYWORDS :

Introduction

Pregnancy-induced hypertension (PIH) is one of the major risk factors in present day health care practice because it not only causes maternal mortality but also impairs fetal development during pregnancy [1-3]. Hypertension is directly associated with increased levels of total cholesterol (TC), triglycerides (TGs), low density lipoproteins (LDL) and very low density lipoproteins (VLDL) whereas, at the same time, the levels of high density lipoproteins (HDL) are decreased. TC, TGs, LDL and VLDL are known as bad cholesterol as they play their destructive role in several diseases. Normally, in early pregnancy, altered levels of serum lipid profile increase the risk of PIH [4,5]. Pregnant women having hypertension usually have high levels of TC, TGs, LDL and VLDL whereas, the levels of HDL are decreased as compared to that in normal pregnant women [3]. PIH may cause several critical problems in pregnancy such as premature delivery, intrauterine growth restriction, fetal death, maternal mortality and morbidity [6]. It has been reported that metabolism of lipoproteins is directly associated with PIH [3,7]. Role of lipid profile such as TC, TGs, HDL, LDL and VLDL in PIH, the aim of our study was to compare lipid profile in hypertensive & normotensive pregnant women. we also calculated the ratios of TC/HDL, TGs/HDL and LDL/HDL, and it was found that increased values of these ratios were directly correlated with increased levels of TC, TGs and LDL in hypertensive pregnant women.

Materials and Methods

The study was undertaken in Civil Hospital Ahmedabad. It is a cross sectional study.

A total 200 subjects for the study were selected from the outpatient and in-patient department of obstetrics and gynaecology and also from the labour room.

The informed written consent was obtained from all the participants.

After recruitment, blood pressure (BP) was measured and on the basis of BP, all the participants were divided into two groups i.e. normotensive pregnant women (28 ± 8 years) and hypertensive pregnant women (30 ± 6 years).

Exclusion criteria

Patients with all maternal and/or fetal abnormalities, known renal

disease, diabetes, hepatic dysfunction, dyslipidaemia and pre-existing hypertension before pregnancy expect PIH were excluded from this study in both control and test groups.

Inclusion criteria

All the participants had similar low socio-economic status and dietary habit. The hypertension was diagnosed by the presence of persistent hypertension (more than 140/90 mm of Hg). The participants having persistent hypertension were on a salt restricted diet.

Statistical analysis

GraphPad Prism (version 5.0) was used for statistical analysis. Values for both normotensive and hypertensive pregnant women were expressed as mean \pm SD. Level of significance between hypertensive and normotensive pregnant women were performed using the Student t-test. P value < 0.05 was considered statistically significant. Comparison of BP and serum lipid profile between normotensive and hypertensive pregnant women was calculated using Pearson Correlation Coefficient.

Results

Table 1 : Comparison of lipid profiles between normotensive and hypertensive pregnant women

Parameters	Participants	
	Normotensive (n = 50)	Hypertensive (n = 150)
BP (mm Hg)	115/75	148.45/95.40
TC (mg/dL)	152.45 ± 1.99	183.90 ± 4.11
TGs (mg/dL)	105.31 ± 8.53	161.02 ± 3.58
HDL (mg/dL)	49.41 ± 1.56	37.16 ± 1.64
LDL (mg/dL)	70.48 ± 2.14	136.50 ± 3.17
VLDL (mg/dL)	41.06 ± 1.70	117.06 ± 1.05
TC/HDL	3.08 ± 0.00	5.08 ± 0.00
TGs/HDL	2.13 ± 0.00	4.49 ± 0.00
LDL/HDL	1.42 ± 0.00	3.67 ± 0.00

Clinical data were collected from normotensive and hypertensive pregnant women to characterize the lipid profile and BP within study groups (Table 1). Body mass index was significantly increased in all the participants as was expected from inclusion criteria (data not shown). Mean BP (SBP/DBP) was significantly increased in

hypertensive pregnant women as compared to that in normotensive pregnant women (Table 1). In hypertensive pregnant women, the serum levels of TC, TGs, LDL and VLDL were significantly high ($P<0.05$) whereas, the serum level of HDL was significantly low ($P<0.05$) when directly compared with that of normotensive pregnant women (Table 1). We also calculated the ratios of various lipid profiles such as TC/HDL, TGs/ HDL and LDL/HDL. The values of

these ratios (TC/HDL, TGs/HDL and LDL/HDL) for hypertensive pregnant women were significantly higher as compared to that in normotensive pregnant women (Table 1). The significant difference between the ratios of various lipid profile in hypertensive and normotensive pregnant women was significantly correlated with that of serum levels of these lipid profile in hypertensive pregnant women.

Table 2: Comparison of lipid profiles in different trimesters of normotensive and hypertensive pregnant women

Parameters	Participants					
	Normotensive Pregnant Women			Hypertensive Pregnant Women		
	1 st trimester	2 nd trimester	3 rd trimester	1 st trimester	2 nd trimester	3 rd trimester
BP	115/75	118/75	120/77	148.18/95	157.52/98.69	159.82/100
TC	152.45±0.99	156.56±2.059	147.36±1.26	183±9.61	189.57±7.64	198.49±6.12
TGs	105.31±3.53	99.68±2.56	107.52±1.89	161.91±8.24	173.70±7.11	177.75±6.45
HDL	49.41±1.56	46.34±0.89	52.08±2.05	37.17±2.58	35.17±3.22	33.39±2.31
LDL	70.48±0.14	74.48±1.26	69.43±1.09	136.2±5.78	145.30±5.50	152.50±4.59
VLDL	41.06±0.70	39.18±2.82	43.28±1.15	117.66±2.19	124.13±1.05	129.35±0.87
TC/HDL	3.08±0.00	3.37±0.00	2.82±0.00	5.08±0.00	5.30±0.00	5.85±0.00
TGs/HDL	2.13±0.00	2.06±0.00	2.64±0.00	4.49±0.00	4.93±0.00	5.32±0.00
LDL/HDL	1.42±0.00	1.59±0.00	1.33±0.00	3.67±0.00	4.13±0.00	4.56±0.00

The consistency of high SBP/DBP was maintained throughout the whole pregnancy period in pregnant women when directly compared to SBP/DBP of normotensive pregnant women (Table 2). We also measured the levels of serum lipid profile of all participants in all trimester periods (1st, 2nd and 3rd) and then compared these serum levels between normotensive and hypertensive pregnant women (Table 2). The serum levels of TC, TGs, LDL and VLDL were consistently increased ($P<0.01$) whereas, the serum level of HDL was consistently decreased ($P<0.01$) from 1st trimester towards 3rd trimester in hypertensive pregnant women. Moreover, we also compared the values of serum levels of lipid profiles within trimester wise between these two groups. The serum levels of TC, TGs, LDL and VLDL in hypertensive pregnant women were significantly very high ($P<0.05$) as compared to that of normotensive pregnant women. Contrarily, the serum level of HDL was consistently remained very low ($P<0.05$) in hypertensive pregnant women in all trimesters when directly compared with that of normotensive pregnant women (Table 2).

Discussion

lipid profile is the regulation of blood pressure throughout the pregnancy period. We used normotensive pregnant women as a control group, whereas, hypertensive pregnant women were test group. It is common that with the increase in pregnancy age, lipid profiles increased gradually [8]. In study, serum levels of TC, TGs, LDL and VLDL were significantly increased whereas, the level of HDL was significantly decreased in hypertensive pregnant women (Table 1). PIH is characteristically associated with hypertriglyceridemia. The principal modulator of hypertriglyceridemia is oestrogen which is also associated with hyperoestrogenaemia during pregnancy [9]. Oestrogen induces hepatic production of TGs that causes PIH and endothelial dysfunction through the generation of LDL and VLDL [3,10]. We have observed that the serum lipid profile of normotensive pregnant women showed insignificant differences among all three pregnancy trimesters (Table 2). In hypertensive pregnant women, the serum levels of TC, TGs, LDL and VLDL were significantly increased ($P<0.01$) during the 3rd trimester of pregnancy as shown in table 2. In study, no significant ($P<0.05$) alteration of TC could be found in the 3rd trimester of normotensive pregnant women when compared with the serum levels of TC in 1st trimester of normotensive pregnant women. The serum levels of TC in the 3rd trimester of hypertensive pregnant women were significantly higher ($P<0.01$) when compared with the serum levels of TC in 1st trimester of hypertensive pregnant women (Table 2). HDL is good cholesterol for our health as it regulates the BP towards normal levels. In our present study, the serum levels of HDL were not significantly changed ($P<0.05$) in the 3rd trimester of normotensive pregnant women (Table 2). In hypertensive pregnant women, the serum levels of HDL were significantly decreased in the 3rd trimester

of pregnancy. We also calculated the ratios of lipid profiles (TC/HDL, TGs/HDL and LDL/HDL) in our present study. The values of these lipid profile ratios followed the same pattern as TGs, TC, HDL and LDL observed in normotensive and hypertensive pregnant women (Table 2). Therefore, it is important to conduct such studies in which management of PIH is evaluated with different treatment modalities

Conclusion

Our conclude that abnormal levels of lipid profile especially TGs, TC, LDL and VLDL may contribute in the promotion of hypertension in pregnant women. This association may help to investigate the underlying pathological process of hypertension in pregnancy. It is therefore imperative that serum lipid profiles should be continuously monitored throughout the whole pregnancy period as it would be helpful in the early detection and/or developing the strategies to prevent any obstetric-associated complication during PIH and/or at the time of delivery.

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