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Study of association between severity of pregnancy induced hypertension and birthweight of new born

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Abstract
Introduction: Pregnancy-induced hypertension (PIH) is a highly prevalent pregnancy complication with adverse effects on maternal and infant health. Birth weight is a key predictor of Newborn outcome and indicator of health in Newborn. The objective of our study is to find the association between severity of PIH on birth weight of new born.
Methods: A prospective study involving 100 pregnant women with PIH, visiting out patient department of OBG, at Karwar institute of medical sciences hospital, was conducted from July 2019 to January 2020. Parameters such as blood pressure, serum uric acid, grade of PIH, birth weight of Newborn post delivery were noted. Data was analyzed by chi-square test.
Result: This study observed the reduction in the weight of new born with increase in severity of PIH.
Conclusion: Present study shows that, PIH adversely affects the weight of Newborn. With increase in severity of PIH, birth weight of new born decreases.

Keywords: Pregnancy Induced hypertension, birthweight, new born, uric acid

Introduction
Pregnancy-induced hypertension (PIH) is a highly prevalent pregnancy complication with adverse effects on maternal and infant health. The prevalence of PIH is 6.9% [1]. In India, the incidence of preeclampsia is reported to be 14% [2].
PIH is a multisystem disorder of unknown etiology characterized by development of hypertension to the extent of 140/90 Hg or more with /without proteinuria after 20 weeks in previously normotensive and non-proteinuria women .PIH includes gestational hypertension, pre-eclampsia & eclampsia. The criteria for classification are as follows. Gestational hypertension is a condition with blood pressure more than or equal to 140/90 mm Hg for first time in pregnancy after 20 weeks, without proteinuria. Preeclampsia is a condition with blood pressure >140/90 mm of Hg for the first time in pregnancy after 20 weeks, with proteinuria. Eclampsia is a condition with blood pressure >140/90 mm of Hg for the first time in pregnancy after 20 weeks, with proteinuria, complicated with grandmal seizure
As preeclampsia is a multisystem disorder several biochemical markers like uric acid and urine albumin are used in assessment of severity of the disease [4]. Maternal hyperuricemia was associated with adverse maternal, perinatal outcomes in women with hypertensive disorder of pregnancy [5].
The diagnosis of pre-eclampsia (International Society for the Study of Hypertension in Pregnancy) is determined by the presence of elevated blood pressure combined with significant proteinuria (≥0.3 g/24 hours) after the 20th week of gestation in a previously normotensive, non-proteinuric patient [6]. The presence of significant proteinuria, in addition to hypertension, predisposes a pregnant woman to coagulopathy, liver disease, and stroke. Serious perinatal morbidity occurs in the form of preterm delivery (often iatrogenic) and fetal growth restriction [6]. Low birth weight is defined as the live births with less than 2.5 kg weight [7]. PIH patient due to pre term delivery are more prone for having low birth weight infant, these infants are at a greater risk of having diseases and disabilities such as cerebral palsy, visual problems, learning disabilities [7]. Low birth weight is a key determinant of infant survival, health and development [7]. The newborn are categorized based of weight as, < 2.5 Kg as Low birth weight, 2.5 – 3.5 kg as Normal birth weight &> 3.5 Kg as above normal weight [8]. Small for gestational age(SGA) is defined as a weight below the 10th percentile for the gestational age [9].

The present study was conducted to study the association between severity of pregnancy induced hypertension and birth weight of newborn.

Materials and Methods

This was a prospective study on pregnant women visiting department of Obstetrics and gynecology at Karwar institute of medical sciences, Karwar. 100 pregnant women with PIH in third trimester are recruited for the study, after taking informed consent. The study was conducted for 6 months duration from July 2019 to January 2020, after obtaining approval from institutional ethical Committee.

Pregnant women with PIH in their third trimester irrespective of the age and parity are included in the study.

Exclusion criteria

- Pregnant women with chronic hypertension, with secondary causes of hypertension like chronic cardiovascular disorder, renal dysfunction.
- Gestational diabetes mellitus,
- Pregnancy with Placenta Previa
- Case of multiple pregnancies

In the present study 100 pregnant women fulfilling the inclusion criteria were regularly monitored for blood pressure. The routine antenatal investigations like hemoglobin value, blood group estimation, platelet count, Serum tests like HIV, HbsAg, VDRL, ultrasonography scan was done. PIH profile was done which includes renal function test, liver function test, serum uric acid level and urine albumin to categorize the patient under different categories of PIH in patients with hypertension.

The selected patients are called for regular antenatal visits and are followed up till she undergoes delivery. The birth weight of the new born is recorded immediately after its birth to the nearest decimal of Kg. Babies weighing < 2.5 Kg as Low birth weight, 2.5 – 3.5 kg as Normal birth weight &> 3.5 Kg as high birth weight.

Data was analysed using chi square test

Results

A total of 100 pregnant women with PIH participated in the study and we noted the following observation in our study

Table 1: Distribution of cases according to severity of PIH

Severity of hypertension	Number of cases	%
Gestational hypertension	48	48
Preeclampsia	47	47
Eclampsia	5	5
total	100	100

Out of 100 participants, 48% of participants have gestational hypertension, 47% of participants have preeclampsia, 5% of participants have eclampsia (TABLE 1)

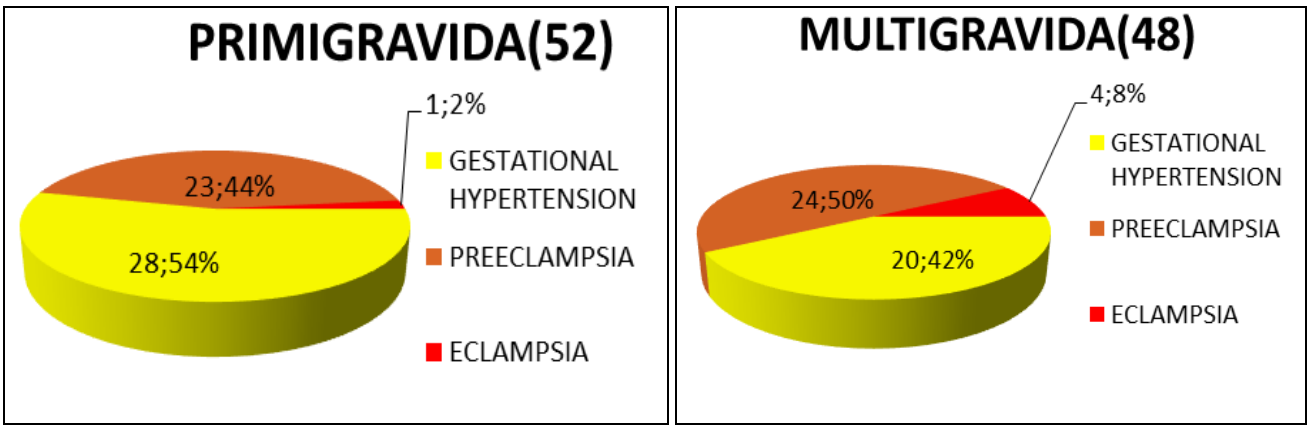

Fig 1: Distribution of Cases with Parity

FIGURE 1 describes the distribution of cases with parity, where in among 52 primigravida women, 28(54%) had gestational hypertension, 23(44%) had preeclampsia, 1(2%) had eclampsia. Among 48 multigravida , 20(42%) had gestational hypertension, 24(50%) had preeclampsia, 4(8%) had eclampsia.

Table 2: Distribution of weight of new-born with severity of PIH

Grades of PIH [N=100]	New-Born Weight (Kg)						P value (p< 0.05)
	1.5-2.4(Kg)	%	2.5 - 3.4	%	≥3.5	%	
Gestational hypertension. (n=48)	15	31.25	28	58.33	5	10.42	0.0026
Preeclampsia (n=47)	31	65.95	14	29.8	2	4.25	
Eclampsia (n=5)	5	100	-		-		

Table 2 describes distribution of weight of newborn with severity of PIH.Among 48 participants belonging to gestational hypertension ,weight of 15(31.25%) newborn were between 1.5-2.4kgs ,weight of 28(58.33%) newborn were between 2.5-3.4kgs, weight of 5(10.42%) newborn were equal to or more than 3.5kgs ; Among 47 participants having preeclampsia, weight of 31(65.95%) newborn were between 1.5-2.4kgs ,weight of 14(29.8%) newborn were between 2.5-3.4kgs, weight of 2(4.25%) newborn were equal to or more than 3.5kgs; Among remaining 5 participants who had eclampsia, weight of all newborn were between 1.5-2.4kgs. It can be observed that the birth weight of new born is inversely related to severity of hypertension in mother. The table is statistically significant with p value of 0.0026

Table 3: Distribution of weight of new-born with maternal urine albumin in pregnancy

Urine Albumin [N=100]	New-Born Weight (Kg)						P value at $p< 0.05$
	1.5 - 2.4	%	2.5 - 3.4	%	≥3.5	%	
0 (n=48)	18	37.5	27	56.25	3	6.25	0.0602
+1(n=28)	16	57.14	10	35.7	2	7.1	
+2(n=18)	15	83.3	3	16.7	-		
+3(n=3)	2	66.7	1	33.3	-		
+4(n=3)	3	100	-		-		

Table 3 describes the distribution of weight of newborn with urine albumin during pregnancy. Wherein , among 48 participants with no albumin in urine, weight of 18(37.5%) newborn were between 1.5-2.4kgs ,weight of 27(56.25%) newborn were between 2.5-3.4kgs, weight of 3(6.25) newborn were equal to or more than 3.5kgs .Among 28 participants with 1+urine albumin, weight of 16(57.14%) newborn were between 1.5-2.4kgs,weight of 10(35.7%) newborn were between 2.5-3.4kgs, weight of 2(7.1%) newborn were equal to or more than 3.5kgs .Among 18 participants with 2+ urine albumin, weight of 15(83.3%) newborn were between 1.5-2.4kg,weight of 3(16.7%) newborn were between 2.5-3.4kgs.Among 3 participants with 3+ urine albumin , weight of 2(66.7%) newborn were between 1.5-2.4kgs ,weight of 1(33.3%) newborn were between 2.5-3.4kgs, among 3 participants with 4+urine albumin ,weight of all newborn were between 1.5-2.4kgs.The p value was not statistically significant.

Table 4: Distribution of weight of new born with uric acid level

URIC ACID mg/dl [N=100]	New-Born Weight (Kg)						P value at $p< 0.05$
	1.5 - 2.4	%	2.5 - 3.4	%	≥3.5	%	
2-4 (n=39)	10	25	23	61.1	6	13.9	0.00093
4-6 (n=39)	24	63	14	34.2	1	2.6	
6-8 (n=20)	16	80	4	20	-		
≥8 (n=2)	2	100	-		-		

Table 4 describes the distribution of weight of newborn with uric acid level during pregnancy. Wherein among 39 participants with uric acid level between 2-4mg/dl , weight of 10(25%) newborn were between 1.5-2.4kgs ,weight of 23(61.1%) newborn were between 2.5-3.4kgs, weight of 6(13.9%) newborn were equal to or more than 3.5kgs .Among 39 participants with uric acid level between 4-6 mg/dl, weight of 24(63.2%) newborn were between 1.5-2.4kgs, weight of 14(34.2%) newborn were between 2.5-3.4kgs, weight of 1(2.6%) newborn were equal to or more than 3.5kgs.Among 20 participants with uric acid level between 6-8 mg/dl, weight of 16(80%) newborn were between 1.5-2.4kgs ,weight of 4(20%) newborn were between 2.5-3.4kgs.Among 2 participants with uric acid level more than or equal to 8mg/dl, weight of all newborn were between 1.5-2.4kgs. It was observed that the birth weight of newborn is inversely related to the concentration of serum uric acid in mother. The table is statistically significant with p value of 0.00093

Discussion

In the present study, we considered 100 pregnant mothers with PIH. Among them 48 mothers had gestational hypertension, 47 mothers had preeclampsia, and 5 mothers had eclampsia.

The occurrence of PIH was found to be more among primigravida when compared to multigravida, 52% in primigravida and 48% in multigravida

In the present study it was found that the birth weight of the newborn is inversely related to severity of PIH. More severe is the grade of PIH, lesser will be the weight of newborn. The result found in this study is similar to study conducted by Gupta D *et al.* [10], in which it was found that in mild PIH, fetal weight of 80.32% were ranging between 2500-3000grams. In sever PIH 64.28% were below 2500 grams where as in eclampsia 72.72% were below 2500grams. Another study conducted by patel *et al.* [11], also had similar result in which 53.12% of babies born to mother having PIH were low birth weight babies. Hence, this suggests that with increase in severity of PIH birth weight of newborn decreases.

In the present study it was found that urine albumin in women with PIH, had inverse correlation with birth weight of newborn. There is decrease in birth weight of new born with increase in levels of urine albumin. The observed table was not found to be statistically significant mostly due to lesser number of cases but, the result is in correspondence with study conducted by Archana Kumari *et al* [12], who found that out of 200 deliveries, as the maternal albuminuria increased 26(13%) were still birth and 20(10%) were early neonatal death .Of the rest, 74% of newborn were born with low birth weight.

This result is also in correspondence with Patricia chan *et al* [13], who concluded that with increasing proteinuria, there is increased risk of adverse maternal and fetal outcome. This variation in statistical significance in this present study may be due to less number of patients included in study as compared to the mentioned studies.

In the present study it was found that serum uric acid level in women with PIH had inverse correlation with the birth weight of the new born. The decrease in birth weight of new born was noted with increase in levels of serum uric acid. This observation was found to be similar to study conducted by Naina Kumar *et al.* [6] who concluded that hyperuricemia was associated with adverse maternal, perinatal outcome in women with hypertensive disorder.

The result is also similar to study conducted by Yalamati P *et al.* [14], who concluded that high serum uric acid levels in mother is associated with low birth weight and delivery by caesarian section due to fetal distress. These biochemical parameters help us in monitoring patients with hypertension and help us in timely delivering PIH mothers, so as to avoid complications in both newborn babies and mothers.

Conclusion

From the present study it can be concluded that, the pregnancy induced hypertension adversely affects the weight of the newborn. With increase in severity of PIH, the birth weight of

the new born decreases. An increase in the level of serum uric acid and urine albumin is also found to have adverse effect on the weight of new born.

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