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Study of Feto-Maternal Outcome in Pregnancy Induced Hypertension

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methods: 250 cases of PIH were studied and divided according to severity. The maternal and fetal outcome parameters were documented and analysed using statistical methods.

Results: More the severity of PIH, more are the chances of maternal and fetal complications. Earlier onset of PIH was also seen more in severe cases as were the number of inductions.

Conclusion: T he clinical course of PIH is progressive and is characterised by continuous deterioration that is ultimately stopped only by delivery. Early detection and appropriate management of the pregnancy may improve the outcome for both the mother and the fetus.

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I. Introduction

Pregnancy induced hypertension is one of the most common causes of both maternal and fetal morbidity and mortality. It is a pregnancy – specific syndrome that can virtually affect every organ system. It is a challenge to be addressed and overcome if there is to be any significant improvement in maternal and perinatal health.

Although the cause of PIH still remains unknown, evidence for its manifestation begins early in pregnancy. Covert pathophysiological changes occur that gain momentum across gestation and eventually become clinically apparent. Unless delivery supervenes, these changes ultimately result in multi – organ involvement with a clinical spectrum ranging from barely noticeable to one of cataclysmic deterioration.

Eclampsia, disseminated intravascular coagulopathy, acute renal failure, HELLP syndrome, intra - cerebral haemorrhage, antepartum haemorrhage and even maternal death can occur. Long term complications like persistent hypertension and cardiovascular morbidity are known risks for the mothers suffering from PIH.

Fetal complications like intra - uterine growth retardation, sudden intra - uterine fetal death, still births, preterm and low birth weight babies, increased need for NICU care, increased neonatal morbidity and mortality are prevalent.

An attempt has been made in the present study to identify the factors affecting feto – maternal outcome in cases of pregnancy induced hypertension so as to be able to identify them at the earliest and offer a better outcome to both mother and baby.

II. Materials and Methods

This was a prospective study carried out over a period of 1 year from 1st Jan 2009 till 31st Dec 2009 at Grant medical college and Sir J. J. Group of hospitals after clearance from ethical committee. 250 patients of pregnancy induced hypertension were studied. They were divided into mild, moderate and severe PIH. The cases with systolic blood pressure greater than 130 mmHg, diastolic blood pressure greater than 90 mmHg on two measurements taken 6 hours apart, in association with proteinuria more than 300 mg in 24 hours urine were included in the mild preeclampsia group. The cases were accepted as mild preeclampsia if the the diastolic blood pressure was less than 100 mmHg and as moderate preeclampsia if the diastolic blood pressure was 110 mmHg. Severe cases were defined if the following criteria were present: Systolic blood pressure ≥ 160 mm Hg, Diastolic blood pressure ≥ 110 mm Hg and Proteinuria 3+ or more.

A prestuctured proforma was filled and parameters of maternal and fetal outcome were tabulated. Statistical tests like the Chi square test and calculation of Spearman's rho were applied. A p value < 0.001 was accepted as significant.The results obtained were compared with other studies from textbooks and journals.

III. Results

There were 151 (60%) cases of mild PIH, 52 (21%) cases of moderate PIH and 47 (19%) cases of severe PIH.

107 i.e. 43% cases were in 21-25 yr age group, 62 i.e. 25% in the 26-30yr age group, 49 i.e. 19% in <20 yr and 33 i.e. 13 % were above 30 yrs. In 47 cases of severe PIH, 12 (25.5%) of the patients were in the ≤ 20 yrs age group, 19 (40.5%) were ≥ 30 yrs of age, whereas 8 (17%) were in the ages between 21-25 yrs and 26-30 yrs respectively.

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149 (60%) of the patients were primigravidae, 55 (22%) were of second gravida, 27 (11%) were G3 and 19 (7%) were grand multigravidae. 32 i.e. 68% of the patients with severe PIH were primigravidae and 5 (10.7%) were grand multigravidae. 6 (12.8%) and 4 (8.5%) were of the second and third gravida respectively.

155 i.e. 62% of the patients had > 3 ANC visits, 72 i.e. 28% had between 1 and 3 visits while 23 i.e. 9.2% were unregistered.

There is a significant negative correlation between the number of ANC visits and PIH severity when analysed statistically (Spearman's rho= -0.311, $p<0.001$).

Out of 250 cases, 81.2% had BMI in the normal range, 4.8% were underweight and 14% patients were overweight. No correlation was seen between BMI & severity of PIH (Spearman's rho= -0.046, $p=0.468$).

When the position of placenta was studied, lateral placenta was seen in 44.6% cases of severe PIH whereas only 17.14% of mild and moderate cases had lateral placenta. Thus we can see that in cases of severe PIH, the incidence of lateral position of placenta was significantly higher (Chi- square = 16.874, $p<0.001$).

Table no 1 : shows the maternal complication in the different classes of PIH

Table No 1 : Maternal Complications

COMPLICATIONS	MILD PIH	MODERATE PIH	SEVERE PIH
CCU ADMISSION	*0*	*0*	*3* ***(6.4%)***
IMMINENT ECCLAMPSIA	*0*	*5* **(9.6%)**	*13* ***(27.8%)***
ECLAMPSIA	*0*	*3* ***(5.8%)***	*11* ***(23.4%)***
ABRUPTIO PLACENTAE	*1* ***(0.7%)***	*3* ***(5.8%)***	*1* ***(2.1%)***
CEREBROVASCULAR ACCIDENT	*0*	*0*	*1* ***(2.1%)***
DIC	*0*	*0*	*1* ***(2.1%)***
ACUTE RENAL FAILURE	*0*	*0*	*1* ***(2.1%)***
MORTALITY	*0*	*1* ***(1.9%)***	*2* ***(4.3%)***
TOTAL	*151*	*52*	*47*

In severe cases of PIH, there were CCU admissions in 6.4% cases, imminent ecclampsia in 27.8% cases and abruptio placentae, DIC, acute renal failure in 2.1% cases. Maternal mortality was seen in 4.3% cases.There is a significant positive correlation between occurrence of maternal complications & severity of PIH (spearman's rho= 0.532, $p<0.001$) i.e. more the severity of PIH, more are the chances of complications.

175 i.e. 70 % cases delivered spontaneously and 75 i.e. 30% needed induction.

When correlated with severity of PIH, 42 (89.3%) of severe PIH cases required induction, 26 (50%) of cases of moderate and 7 (4.6%) cases of mild PIH needed induction.There is a significant positive correlation between induction of labour and severity of PIH (spearman's rho = 0.729, $p<0.001$) i.e. Severe PIH cases needed to be induced. Out of all the cases, 153 i.e. 61.2% cases were delivered vaginally and 97 i.e. 38.8% required LSCS, the most common indication being fetal distress.

Table no 2 shows the fetal outcome. There was a significant negative correlation of severity of PIH with birth weights (Spearman's rho = -0.323, $p<0.001$). Thus cases of severe PIH had babies with lower birth weights. In our study, total 69 babies needed NICU admissions i.e. 27.6%. The most common reason for admission was preterm with low birth weight (52%). There is a significant positive correlation between NICU admissions & severity of PIH (spearman's rho= 0.261, $p<0.001$) i.e. severe cases of PIH needed more NICU admissions.

Table No 2 : Fetal Outcome

Severity Of Pih	Birth Weight < 2 Kg	Small For Geestation Age Babies	Nicu Admission
MILD PIH	13 **(8.6%)**	19 **(12.6%)**	27 **(17.9%)**
MODERATE PIH	23 **(44%)**	34 **(65.5%)**	22 **(42.3%)**
SEVERE PIH	36 **(76.6%)**	38 **(80.9%)**	20 **(42.6%)**

Total fetal wastage seen in this study was 37 i.e. 14.8% of all cases as shown in Table no 3.There is a significant positive correlation between occurrence of fetal wastage & the severity of PIH (spearman's rho= 0.482, p<0.001) i.e. more the severity of PIH, more are the chances of fetal wastage.

Table No 3 : Fetal Wastage

Fetal Wastage	Mild Pih	Mod Pih	Sev Pih	Total
Abortion	1	0	8	9
Fsb	1	4	7	12
Msb	0	2	5	7
Nnd	0	4	5	9
Total Number	2	10	25	37
Percentage	1.3%	19.2%	53%	

The gestational age of onset of PIH was compared in the 3 groups. In 22 (8.8%) cases, the onset was at < 28 wks, in 33 (13.2%) between 28 -32 wks, in 82 (32.8%) between 32 -36 wks and in 113 (45.2%) the onset was beyond 36 wks gestation.

In cases of severe PIH, the onset < 28 wks was seen in 31.9% cases whereas in mild PIH it was in 1.3% cases. There was a significant negative correlation between gestational of onset of PIH and severity of PIH (spearman's rho=-0.467, p<0.001), thus showing that severe PIH cases have an earlier onset. Table no 4 and 5 show the correlation of age of onset of PIH with maternal and fetal outcome.

Table No 4 : Gestational Age Of Onset Of Pih And Maternal Outcome

Age Of Onset	Maternal Complications	Induction Of Labour	Preterm Delivery	Lscs	Total Number
< 28 wks	9 *(40%)*	18 *(81.8%)*	20 *(90.9%)*	5 *(22.7%)*	22
28 – 32 wks	11 *(33.3%)*	20 *(60.6%)*	29 *(87.9%)*	13 *(39.4%)*	33
32 – 36 wks	18 *(21.9%)*	22 *(26.8%)*	44 *(53.7%)*	33 *(40.2%)*	82
>36wks	7 *(6.2%)*	15 *(13.3%)*	0	46 *(40.7%)*	113
TOTAL	45	75	93	97	250

Table No 5 : Gestational Age Of Onset Of Pih And Fetal Outcome

Age Of Onset	Sga	Nicu Admission	Fetal Wastage	Total
< 28 wks	14 *(63.6%)*	8 *(36.4%)*	16 *(72.7%)*	22
28 – 32 wks	19 *(57.6%)*	18 *(54.5%)*	7 *(21.2%)*	33
32 – 36 wks	32 *(39%)*	20 *(24.4%)*	8 *(9.8%)*	82
>36wks	26 *(23%)*	23 *(20%)*	6 *(5.3%)*	113
TOTAL	91	69	37	250

IV. Discussion

Pregnancy induced hypertension is a pregnancy- specific multi system disorder affecting both the mother and the baby.

In our study, total 250 cases were classified as per severity of PIH. 151 (60%) patients had mild PIH. The rest were almost equally distributed as moderate or severe cases – 52 cases (21%) with moderate PIH and 47 cases (19%) with severe PIH. 20 patients i.e. 43% cases with severe PIH were in the extremes of age groups.

Eskenazi B, Fenster L et al in a multivariate analysis of risk factors of PIH in 1991 found that women that either spectrum of age were more susceptible to PIH. [1]

Similar findings were also seen in a study by C. J. Lee et al in a study for risk factors of PIH in the Asian population in 2000.[2]

PIH often affects young and nulliparous women and this was shown in our study as well as other studies done by Eskenazi B, Fenster L and Sidney S [1] and Campbell DM et al [3].

Antenatal care is one of the most important determinants of early detection of PIH. Regular visits will help identify such cases at the earliest and enable prompt intervention, thus improving the pregnancy outcome. In the present study, of all 250 cases,155 i.e. 62% had more than 3 ANC visits, 72 i.e. 28% cases had between 1-3 visits, while 23 i.e. 9.2% were unregistered that is they had not received any antenatal care. There was a significant negative correlation found in this study between number of ANC visits and PIH severity indicating that patients with fewer ANC visits had more severe PIH. Bandar Abbas et al in their study showed that women of PIH with IUGR babies had less than three antenatal visits during pregnancy. [4]

There was no correlation found between BMI and severity of PIH in this study. However other studies like Lisa et al [5] and Dorothea Mostello et al [6] have shown the increased incidence of PIH with higher BMI. Ahmet Ursavas reported obesity as an independent risk factor for PIH and preeclampsia in 2008. [7]

In our study, in cases of severe PIH the incidence of lateral placenta was significantly higher. This result is in accordance with the study of Kofinas et al [8] who state that of their preeclamptic women, 74% had unilateral placental location and a 2.8 fold risk of preeclampsia.

In our study, the total maternal complications seen were 45 i.e. in 18 % of the cases. 3 (1.2%) patients were admitted in the critical care unit, 18 (7.2%) had imminent eclampsia, 14 (5.6%) suffered from eclampsia, 4 (1.6%) had abruption placentae and disseminated intravascular coagulopathy and acute renal failure was seen in 1 (0.4%) case. In cases of severe PIH in particular, there were CCU admissions in 6.4% cases, imminent eclampsia in 27.8% cases and abruptio placentae, DIC, acute renal failure in 2.1% cases and mortality was seen in 4.3% cases.

Maternal mortality was seen in 3 (1.2%) cases. One such was of a second gravida with full term pregnancy with severe PIH and Intrauterine Fetal Demise. Patient had only 2 ANC visits. She had been brought to the hospital in DIC and was immediately admitted in the CCU. However despite blood product transfusion she went into Acute Renal Failure and could not be resuscitated. The second case was of a primigravida with 32 weeks pregnancy who presented with eclamptic convulsions and fresh still birth. In the third case, the patient had presented with severe PIH with term pregnancy with eclampsia. Emergency LSCS had been done which was uneventful. Patient was in the ward as the baby was in the NICU for preterm status. On day 18 post delivery, there was a sudden rise in her blood pressure which had previously come to normal post delivery. She suffered from a Cerebrovasclar accident and died despite immediate CCU transfer and resuscitation.

In the present study, there was a significant positive correlation between occurrence of maternal complications & severity of PIH (spearman's rho= 0.532, $p<0.001$) i.e. more the severity of PIH, more are the chances of complications. These were similar to results obtained by Yucesoy et al [9] and Yadav et al [10]. In cases of PIH, due to uteroplacental insufficiency, there are increased chances of intra – uterine growth restriction. Also in severe cases needing early induction, preterm births are common. Thus the babies are of lower birth weights.

In the present study, 113 i.e. 45.2% babies had birth weight > 2.5 kg, 65 (26%) between 2 – 2.5 kg, 29 (11.6%) between 1.5 – 2 kg, 28 (11.2%) between 1 – 1.5 g and 15 (6%) with < 1 kg. There was a significant negative correlation of severity of PIH with birth weights (Spearman's rho = -0.323, $p<0.001$). Thus cases of severe PIH had babies with lower birth weights. Ye RW et al [11] in their study in 2010 showed the incidence rates of low birth weights in mild, moderate, and severe subgroups as 2.5% 4.9% and 11.9% respectively. The rates increased with the severity of PIH. in another study by Buchbinder et al, they have shown that in women who have gestational hypertension or preeclampsia, increased rates of preterm delivery and delivery of small-for-gestational-age infants are present only in those with severe disorder. [12]

In our study, a significant positive correlation was seen between the NICU admissions and severity of the cases, i.e. severe PIH cases had more chances of the baby getting admitted in NICU which has also been studied by Ray et al [13].

Sudden vasospasm, chronic utero-placental and feto-placental insufficiency and complications like abruption placentae put the babies of PIH mothers at higher risk of perinatal mortality. In the present study, the fetal wastage like abortion, still births and neonatal deaths were studied and were seen more in severe cases of PIH. In studies by Yadav et al [10] and Yucesoy et al [9], perinatal mortality rate was found to be higher in severe cases of PIH.

In the present study, cases with earlier onset of PIH had a more severe course of the disease and increased maternal and fetal morbidity as also shown by study conducted by Ingrid PM et al [14].

Termination of pregnancy is the only cure for PIH. In milder cases if the fetus is premature, conservative management can be employed to reduce the risk of neonatal death or serious morbidity due to prematurity. In such cases assessment of fetal well being and placental function are done along with strict toxaemia monitoring of the mother. If the PIH does not improve or it worsens then the pregnancy has to be terminated irrespective of the gestational age to avoid

maternal complications and morbidity. In our study, in 144 i.e. 95.4% cases of mild PIH the patients were admitted and spontaneous labour was awaited and 7 i.e. 4.65 needed to be induced. In severe cases however, 42 i.e. 89.3% cases needed to be induced. There was a significant positive correlation between induction of labour and severity of PIH (spearman's rho = 0.729, $p<0.001$) i.e. severe cases of PIH had to be terminated resulting in preterm and low- birth weight babies. Similar results were seen in a study conducted by Bailey et al [15] and Ye RW et al [11] where cases of severe PIH had to be induced at an earlier gestational age as compared to the mild cases.

V. Conclusion

The clinical course of PIH is progressive and is characterised by continuous deterioration that is ultimately stopped only by delivery. Emphasis should be on early registration and regular ANC visits so as to detect cases of pregnancy induced hypertension as early as possible in turn preventing severity and its associated complications. The fetal well being should be monitored with non stress tests, modified biophysical profile, serial USG with amniotic fluid estimation, Doppler studies so as to detect fetal compromise. Maternal parameters of blood pressure, proteinuria, serum uric acid levels as well as premonitory signs and symptoms should be monitored so as to decide a timely intervention for best feto – maternal outcome.

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