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Original Article

Obstetrics and Gynaecology Section

Pregnancy Induced Hypertension and Feto-Maternal Outcome in a Tertiary Care Hospital in Eastern India: A Prospective Study

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ABSTRACT

Introduction: Pregnancy Induced Hypertension (PIH) is known for its maternal and perinatal complications.

Aim: To assess incidence of PIH and eclampsia in a tertiary care hospital and maternal and perinatal complications associated with it.

Materials and Methods: This is a prospective observational study conducted in the department of obstetrics and gynaecology of Institute of Medical Sciences (IMS) and SUM hospital, Siksha O Anusandhan (SOA) University from July 2015 to December 2017. All deliveries during this period were analysed for incidence of PIH, all PIH cases were analysed for maternal and foetal outcome. All cases delivered during the study period, were diagnosed to have PIH when systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg measured on two occasions 4-6 hours apart beyond 20 weeks of pregnancy. Early onset PIH is defined as; when cases diagnosed before 34 weeks. PIH cases with convulsion were defined as eclampsia. All cases of chronic hypertension due to essential hypertension, chronic renal disease, connective tissue disorder were excluded. Maternal complications studied were cases of HELLP syndrome, Abruptio placentae, PPH, neurological complications, ICU admissions and maternal death. Perinatal complications expressed in terms of stillbirth, NICU admission and incidence of low birth weight. Statistical analysis was done with SPSS version 20.0 software using Yate's corrected chi-square test and unpaired t-test.

Results: Out of 5139 pregnancies 338 (6.57%) had PIH, 40 (0.77%) had eclampsia. PIH is more prevalent in primigravidas (67.4%). Eclampsia is prevalent in adolescents, as age advances incidence of eclampsia reduces and preeclampsia increases, and in elderly, preeclampsia is predominant, proved by unpaired t-test (p=0.003). Late onset preeclampsia is common in our population (93.5%) and 68.1% were term pregnancies. Maternal complication was present in 22/338 (6.5%) cases. It was significantly higher in early onset disease (p=0.001). LSCS rate (p=0.00891) and stillbirth (p<0.001) were significantly higher than general population. NICU admission and low birth weight incidence were also increased.

Conclusion: Pregnancy induced hypertension still remains an important cause of maternal and perinatal morbidity and mortality. Late onset PIH is common in our population. Maternal complications are significantly higher in early onset disease than late onset disease. Early detection by proper antenatal care and timely proper intervention can reduce the complications. Adolescent primigravidas are more prone for eclampsia, the severe form of disease. Avoiding early marriage and explaining need of contraception to this group can reduce adolescent pregnancies and its dreaded complications.

Keywords: Diastolic and systolic blood pressure, Eclampsia, Neonatal intensive care unit, Perinatal, Stillbirth

INTRODUCTION

Pregnancy induced hypertension is a common and important medical problem. According to revised statement from International Society for the study of Hypertension in pregnancy (ISSHP) 2014, any new onset hypertension (systolic ≥140 mmHg and/or diastolic ≥90 mmHg beyond 20 weeks) should be considered as PIH. Normal blood pressure documentation pre-pregnancy or early pregnancy is important. However, pregnancies presenting with hypertension beyond 20 weeks and earlier status unknown, should be managed as cases of PIH [1]. Hypertensive disorders complicate 5-10% pregnancies all over the world [2]. Incidence of hypertensive disorders in India is found to be 10.08% as per data of National Eclampsia Registry (NER). Prevalence of eclampsia is 1.9% among registry patients [3]. Considering a global scenario, according to World Health Organisation (WHO) multi country survey, incidence of hypertensive disorder in pregnancy is 2.73%, incidence of preeclampsia is 2.16% and eclampsia is 0.28% [4].

It is responsible for a major share of maternal and foetal morbidity and mortality. Though, not preventable, early detection and timely proper intervention can reduce the complications substantially. This is possible with improvement of prenatal care at all levels and proper timely management. Prevalence and complications with regard to maternal and foetal morbidity has reduced to a great extent in developed countries which is clearly understood from above mentioned statistics. This is due to good prenatal care. The purpose of this hospital based observational study is to evaluate the extent of the problem in our area and to estimate the foetal and maternal complications associated with it.

MATERIALS AND METHODS

This is a prospective observational study carried out in the department of Obstetrics and Gynaecology of IMS and SUM hospital, SOA University over a period of 30 months (July 2015 to December 2017). Institutional ethical committee clearance was obtained. Out of the 5139 deliveries during this period, 338 patients found to have PIH. PIH was diagnosed when the systolic blood pressure was ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg measured on two occasions i.e. 4-6 hours apart and beyond 20 weeks of pregnancy (Includes all cases of mild and severe preeclampsia and eclampsia). Severe preeclampsia was consider when blood pressure was systolic ≥160 mmHg and diastolic ≥110 mmHg, in HELLP syndrome, in deranged liver function with transaminase level twice the

normal, LDH level twice the upper normal or >650 IU/L. All other cases were considered as mild preeclampsia [5]. Cases of PIH with onset of convulsion cannot be explained otherwise are considered as eclampsia [6]. Cases of chronic hypertension due to essential hypertension, chronic renal disease and primary connective tissue disorders were excluded. Early onset PIH was defined when cases diagnosed before 34 weeks of gestation. Late onset PIH was diagnosed after 34 weeks [7].

Investigations and management was done according to hospital protocol. All cases were evaluated with blood investigations like haemoglobin estimation, platelet count, liver function tests, renal function tests. Coagulation profile (PT, aPTT, INR) was evaluated in clinically suspected cases of abruption, HELLP syndrome, Disseminated Intravascular Coagulation (DIC) patients. Urine protein estimation was done by dipstick method. Obstetric ultrasound with doppler velocimetry was performed in cases where decision to continue pregnancy for some period was decided. Admission Cardiotocography (CTG) was performed in all cases.

All cases of severe hypertension were treated with intravenous labetolol preferably or oral labetolol/nifedipine. Any hypertension diastolic ≥100 mmHg was treated with oral labetolol/nifedipine to maintain blood pressure in normal range. All cases of eclampsia, imminent eclampsia (with features like severe headache, visual scotomata, nausea, vomiting, oliguria, epigastric pain) and severe hypertension were treated with magnesium sulphate by Pritchard's regime. Betamethasone 12 mg, 24 hours apart administered to all pregnancies less than 37 weeks if imminent delivery is not indicated.

All cases beyond 37 weeks of gestation were planned for delivery. Preterm pregnancies were offered conservative management with the investigations mentioned above twice a week except in cases of eclampsia, imminent eclampsia, uncontrolled maternal hypertension despite anti-hypertensives, HELLP syndrome, placental abruption, absent or reverse end diastolic flow in Doppler velocimetry, non-reassuring CTG, still birth. Blood pressure monitoring was done four hourly for those on conservative management.

Maternal complications studied were cases of HELLP syndrome, abruptio placentae, Post Partum Haemorrhage (PPH), neurological complications, Intensive Care Unit (ICU) admissions and maternal death. Perinatal complications expressed in terms of still birth (foetal death after 24 weeks of gestation), Neonatal Intensive Care Unit (NICU) admission and incidence of low birth weight neonates (≤1.5 kg-very low birth weight, <2.5 kg-low birth weight).

A pre-structured proforma containing information about patient's age, obstetric history, expected date of confinement and period of gestation, investigations performed were noted. Cases were divided into mild and severe preeclampsia and eclampsia. Maternal and foetal outcomes mentioned above were evaluated. Caesarean section rate and its indications were noted. Stillbirth rates in PIH patients was estimated and compared with general population in the study period.

STATISTICAL ANALYSIS

Statistical analysis was done using SPSS 20.0 version. Data analysed using unpaired t-test, Yates corrected chi-square test.

RESULTS

Total number of patients admitted and delivered during the study period was 5139. Out of them, 338 (6.57%) women diagnosed to have PIH. A total of 298 (5.7%) had preeclampsia (PE), 177 (3.4%) had mild and 121 (2.3%) had severe PE. Out of it, 40 patients had eclampsia, which accounts for 0.77% of total deliveries. [Table/Fig-1] depicts age distribution of PIH patients. Highest no of cases were in 21-25 and 26-30 years group, because this is the commonest age of pregnancy.

Age (years)	No of cases	Percentage (%)
≤20	20	5.9%
21-25	118	34.9%
26-30	122	36%
31-35	64	19%
35-40	11	3.3%
>40	3	0.9%

[Table/Fig-1]: Age distribution of PIH patients.

Percentage of eclampsia cases was highest in adolescent age group. Declining trend of eclampsia as age advances was observed in the present study. Contrary, preeclampsia incidence is highest in >40 age group and lowest in adolescents. By unpaired t-test p=0.003, which was significant [Table/Fig-2].

Age (years)	Total no of cases (100%)	Eclampsia (%age)	Preeclampsia (%age)
≤20	20	12 (60%)	8 (40%)
21-25	118	16 (13.5%)	102 (86.5%)
26-30	122	9 (7.3%)	113 (92.6%)
31-35	64	2 (3.1%)	62 (96.9%)
35-40	11	1 (9.1%)	10 (90.9%)
>40	3	0 (%)	3 (100%)

[Table/Fig-2]: Distribution of eclampsia and pre-eclampsia cases according to age group.

Out of 338, 228 (67.4%) cases were primigravidas. Eclampsia is commoner in primi (36 out of 40) than multigravida (4 out of 40) (15.7% Vs 3.6%).

Considering distribution of cases according to gestational age at delivery, 316/338 (93.5%) have delivered after 34 weeks. A total of 230 (68.1%) among them were with term pregnancies.

Out of 230 cases of term pregnancies, only 61 cases were at 37 weeks; rest 169 case were 38 weeks or more who have suffered from complications of PIH. Though, dictum is to deliver women with PIH at 37 weeks, we have lost opportunities to detect and treat the condition in 50% cases (169 out of 338).

Maternal complications were analysed and 22 mothers out of 338 (6.5%) had some form of complication.

This includes six cases of HELLP syndrome, six cases of APH (abruptio placentae), four cases of PPH, five cases of neurological complications and one case of maternal mortality. Five cases needed ICU admission, one for HELLP syndrome, one for PPH, three cases with neurological complication.

[Table/Fig-3] depicts maternal complications in PIH patients in relation to gestational age. Comparing the data by Yates corrected chi-square test, p=0.001 which was significant. It signifies maternal complications are more in early onset PIH.

Gestational age	Total no of patients	No of cases with maternal complication	p-value by Yates corrected chi-square test
<34	22	7 (31.8%)	p=0.001
34-36	86	8 (10.4%)	
37-40	230	7 (3.4%)	

[Table/Fig-3]: Maternal complications in relation to gestational age.

Caesarean section rates of PIH patients were compared with that of general population. Caesarean section rate in general population was 2655/5139 (51.6%) and that in PIH patients was 234/338 (69.2%). Comparing two groups by Yate's chi-square test, LSCS rate was significantly high in PIH patients (p=0.00891). Different indications of LSCS in PIH were foetal distress (61), previous caesarean section (31), non-progress of labour/cephalopelvic disproportion/failure of induction (63), mal-presentation (25), severe PIH with poor Bishop score (49) and miscellaneous causes (5).

Total no of twin pregnancies who developed PIH were 27. Total number of twins found in the study period were 113 (out of 5139). Incidence of PIH among twins according to the present study was 23.8%. It shows association of PIH in twin pregnancy is 3.6 times higher than in general population. Comparing the data with chi-square test, p-value is <0.0001. It implies, PIH is significantly associated with twins.

Foetal complications are described as normal when neonate was shifted to mother side. Number of neonates admitted to NICU or still birth was noted. Data analysis was done only for singleton pregnancies, considering association of adverse perinatal outcome in twin pregnancies as such.

Still birth in case of PIH patients compared with total population. A total of 141 cases of stillbirth encountered in total study population (2.74%). Out of 338 PIH cases, there were 28 stillbirths (8.3%). Risk of stillbirth was 3.02 times higher than general population. Comparison of the two groups by chi-square test suggests, p<0.0001. So, stillbirth, an indicator of poor foetal outcome, was significantly raised in PIH compared to normal population.

[Table/Fig-4] depicts perinatal outcome was worst in early onset PE, 12/20(60%) had stillbirth. In late onset PE, 16/291 (5.4%) had still birth and it is 2.74% in general population. Perinatal outcome improves with advancing gestation. In term pregnancies (≥37 weeks), perinatal death is 3.6%, which was more than general population (2.74%). However, putting chi-square test, p=0.042, which was not significant.

Gestational age (weeks)	No of patients	Normal outcome	ICU admission	Death
Total	311	225 (72.4%)	58 (18.6%)	28 (9%)
<34	20	0 (0%)	8 (40%)	12 (60%)
34-36	71	33 (46.5%)	30 (42.2%)	8 (11.3%)
≥37	220	192 (87.4%)	20 (9%)	8 (3.6%)

[Table/Fig-4]: Perinatal complications.

[Table/Fig-5] shows relevance of PIH with birth weight. Analysis was done only in 311 singleton pregnancies. A total of 171/311 (54.9%) had weight ≥2.5 kg; 100/311 (32.1%) were low birth weight (<2.5 kg); 40/311 (12.9%) foetuses were very low birth weight (≤1.5 kg).

Gestational age	≤1.5 kg	>1.5 and <2.5 kg	≥2.5 kg
Total	40 (12.9%)	100 (32.2%)	171 (54.9%)
<34 weeks	17	3	0
34-36 weeks	21	39	11
≥37 weeks	2	58	160

[Table/Fig-5]: Birth weight in PIH patients.

DISCUSSION

Pregnancy induced hypertension is a pregnancy specific disorder with new onset hypertension with or without proteinuria which appears after 20 weeks of pregnancy. Multiple organ system involvement gives rise to adverse maternal and perinatal outcome.

In the present study, overall incidence of pregnancy induced hypertension was 6.57% and that of eclampsia was 0.77%. An Indian study in 2012, quotes incidence of PIH and eclampsia to be 8.96% and 1.7% respectively [8]. As per data of NER, 2013 incidence of PIH is 10.08% and that of eclampsia 1.9% [3]. According to a study in 2015, incidence of PIH and eclampsia 7.9% and 0.9% respectively [9]. A study of eclampsia by Verma K et al., shows incidence of eclampsia to be 0.82% [10]. The present study in 2017 shows incidence of PIH and eclampsia as 6.57% and 0.77% respectively.

Considering these Indian studies, incidence of PIH in India has a steady and slow decline. Incidence of eclampsia has also reduced marginally which implies improvement in antenatal care. But, considering global scenario, WHO multi-country survey, incidence of PIH and eclampsia are 2.73% and 0.28% respectively [4]. It implies, we need to go a long way to improve our antenatal care.

A 70.9% of women with PIH are in 21-25 and 26-30 age group. A 76.34% women with PIH in this age group has been observed in FOGSI-ICOG NER [3] and some other studies [2,9]. This is so, because this is the commonest age for pregnancy.

A 67.4% of PIH cases were primigravida which satisfies the theory that first time exposure to trophoblast is a causative factor. 81% women were primigravida according to NER data [3] and many other studies [11-13].

According to our study, adolescent pregnancies are more prone for eclampsia. As the age advances, incidence of pre-eclampsia increases and chance of eclampsia declines. Similar findings were observed in WHO multi-country survey [4]. Most important complications of adolescent pregnancies are hypertensive disorders of pregnancy, prematurity, low birth weight [14]. Another study with 265 adolescent mothers versus 832 mothers between 20-29 years observed for maternal complications. Most frequent was eclampsia (OR=3.18) followed by preeclampsia (OR=1.82) [15]. According to WHO survey, each year 15 million girls get married before age of 18, 90% give birth when still they are less than 19 years. Half of adolescent pregnancies are unintended. So, early marriage should be highly discouraged. Need for contraception to this group should be explained. Process to reach this target population should be facilitated.

Late onset PIH is most common in our population (93.5%) and early onset in 6.5%. A 68.1% of cases were term pregnancies, i.e., 37 weeks or more. Similar findings observed in study by a Turkish study, 71% late onset preeclampsia and 29% early onset PIH [16]. Screening for early onset PIH is difficult, not cost-effective for country like India. But the trend seen in our study, i.e., 50% cases had continued pregnancy with PIH without detection beyond 37 completed weeks, even up to 42 weeks. And, we all know, delivery is the treatment of the disease. Thirty seven completed weeks is adequate time for the fetus to mature. So, frequent antenatal check up, once a week beyond 36 weeks; for each pregnant woman can identify the disease in milder form and reduce maternal and foetal complications to a great extent in this group of late onset disease.

A total of 22/338 cases (6.5%) cases developed some form of maternal complication in our study which includes one case of maternal mortality. Maternal morbidity was 17.3% in a northern Indian study [17]. In another study, maternal complications observed in 45/250(18%) cases which includes 32 cases of eclampsia and imminent eclampsia. If those cases are not considered, complication rates are 5.2% which is similar to the study [18].

In the present study, analysis by Yate's chi-square test, maternal complications are significantly high in early onset PIH. Early onset PIH is associated with higher maternal mortality and near miss cases [19]. This variant is associated with substantial increase in cardiovascular, respiratory, neurological, renal and hepatic dysfunction [20]. In another study, the women with early onset preeclampsia were put on expectant management and delivered at 34 weeks. This was achieved without any increase in mortality or morbidity to mother [21].

LSCS rate in PIH is significantly higher than normal population (p=0.00891). Considering the indications of PIH, severe PIH with poor Bishop Score is responsible for 49/234 (20.9%) of caesarean sections. Similar findings of increased LSCS rate observed in other studies [4,8,22]. LSCS rate in noted studies is around 50%. For our study, overall LSCS rate is higher for general population and PIH patients. This is because, this is a tertiary care centre to which complicated cases are referred from nearby rural areas and other small hospitals for neonatal and maternal ICU care. Another

important contributing factor is attached in-vitro fertilisation centre to our department.

It is well established that the risk of PIH is higher in twins than in singleton pregnancies. In our study, prevalence of PIH is 3.6 times higher than in general population. Comparing the data by chi-square test, p-value is <0.001, which is significant. Various studies have reported the incidence of PIH is significantly higher in twin pregnancies, between two to three times higher than in singleton pregnancies [23-25].

Foetal outcome in pregnancies affected with PIH was observed in the present study. Total number of still births in case of PIH patients compared with total population. Risk of stillbirths is 3.02 times higher than general population. A 28/338 PIH cases had still birth (8.3%). Comparison of the two groups by chi-square test suggests, p<0.0001. Perinatal outcome is worst in early onset PE, 12/20 (60%) had stillbirth. In late onset PE, 16/291 (5.4%) had stillbirth and it is 2.74% in general population. Similar observation noted in an Indonesian review article which quotes 10 fold increase in perinatal mortality in early onset and 2-fold increase in late onset PE than general population [26]. High relative risk of foetal death observed in pregnancies with preterm PIH [27]. Risk of late foetal deaths increased with low birth weight, severe PIH, smokers [28]. PIH is associated with increased risk of stillbirth and neonatal death [29]. So, foetal death, an indicator of foetal outcome, is significantly raised in PIH compared to normal population.

In the present study, 29.2% are preterm neonates. Prematurity prevalence is 23.65% in another Indian study [30] Stillbirth rate is 10% in the same study which is 8.3% in our study [30]. Stillbirth rate 17.4% in another Indian study [31]. Prematurity rate and NICU admission rate is 46.6% and 26.6% in the same study. Prematurity and NICU admission is 29.2% and 18.6% in our study, which is quite low. The reason behind it is late onset PIH is prevalent in our population. Antenatal corticosteroid was given in every possible case, at least the first dose. Perinatal outcome is worst in early gestational age; outcome improves with advancing gestation in our study. Similar finding observed in other studies [32,33].

In term pregnancies (≥37 weeks), stillbirth is 3.6%, which is more than general population (2.74%). However, putting chi-square test, p=0.042, which is not significant.

Analysis was done only in 311 singleton pregnancies 171/311 (54.9%) had weight ≥2.5 kg, 100/311 (32.1%) were low birth weight (1.5-2.5 kg). A 40/311 (12.9%) foetuses were very low birth weight (≤1.5 kg). In one above mentioned Indian study, 12% cases were very low birth weight, 48% are low birth weight and 40% are normal birth weight [29]. Low birth weight infants were as high as 71.43% and 28.5% were stillborn in an Indian study involving severe PIH and eclampsia patients [34]. A 54.9% newborns had normal birth weight in our study, high compared to other studies. Prevalence of late onset preeclampsia could be explanation for this.

CONCLUSION

PIH contributes to a major chunk of maternal and perinatal morbidity and mortality. Early onset PIH has worst maternal and perinatal outcome. Early detection in a milder form of disease, corticosteroid administration, judicious decision of timing of delivery can improve the outcome. Late onset PIH is more common in our population. Weekly antenatal check-up beyond 36 weeks can detect this early and delivering them will reduce the burden of perinatal and maternal morbidity. Incidence of PIH and eclampsia has a slow decline, but we have to go a long way to reach figures of developed countries. Early marriage should be avoided and need for contraception to this population should be explained and Improvement in antenatal care, obstetric management can reduce its complications.

LIMITATION

Some of the patients enrolled could not be evaluated with all investigations mentioned in our protocol like liver function tests, LDH level etc., due to monetary constraints. So true number of severe PIH cases may be higher than estimated. The reason for NICU admission was not sought for as neonates in NICU were not followed up till discharge. Such data could have better estimated the perinatal morbidity.

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