Hypertension in Pregnancy: Hospital Based Study

J Prakash*, LK Pandey**, AK Singh***, B Kar***

INTRODUCTION

Hypertensive disorders are the most common medical complications of pregnancy and are important cause of maternal and perinatal morbidity and mortality. Hypertension during pregnancy had been described in ancient literature as well. Hypertension is present in 6 to 8% of young women of childbearing age, but the prevalence increases with advancing age and in women with diabetes mellitus, primary renal disease or collagen vascular diseases reaching up to 20% in such populations. However, the prevalence of hypertension during pregnancy is not well documented in Indian literature. Keeping this in mind, the present study was undertaken to study the prevalence and causes of hypertension and its impact on fetal and maternal outcome during pregnancy.

MATERIAL AND METHODS

This study was carried jointly in the departments of Nephrology and Obstetrics and Gynaecology between period of July 2000 to June 2002. All pregnant women attending the antenatal clinic were screened for hypertension. Hypertensive pregnant women were included in the study and they were followed till delivery and 6-8 weeks post delivery. The criteria used for diagnosis and classification of the hypertensive disorder of pregnancy was obtained on the basis of the report of the National High Blood Pressure Education Programme (NHBPEP) working group on high blood pressure in pregnancy as under. Hypertension: It is defined as systolic blood pressure ≥ 140 mm Hg and diastolic blood pressure ≥ 90 mm Hg during pregnancy. Diastolic blood pressure is determined as the disappearance of Korotkoff sound (Phase V).

Proteinuria: It is defined as the urinary excretion of ≥ 0.3 g protein in a 24 hour specimen.

Classification of Hypertension:

1. Chronic hypertension
2. Pregnancy induced hypertension
   a. Preeclampsia-eclampsia

Abstract

Eighteen hundred two pregnant women consisting of 750 primigravida and 1,052 multigravida were screened for hypertension between July 2000 to June 2002. Hypertension was noted in 97 (5.38%) patients. Twenty five patients were lost to follow up and only 72 patients were included in the final study. The age of the patients ranged between 19 to 32 (mean ± SD = 24.75 ± 3.36) years. The majority of patients 41 (57%) were primigravida and 31 (43%) were multigravida. Of 31 multigravida, vast majority (84%) of patients were found to be hypertensive in the third trimester. Only 5 (16%) patient had hypertension in the first trimester. Stage I, II and III hypertension were noted in 18%, 50% and 32% of patients respectively as per JNC-VI criteria. Preeclampsia (PE) was seen in 44.44% (n=32), eclampsia in 40.28% (n=29), HELLP syndrome in 6.94% (n=5), chronic hypertension (HTN) with superimposed PE in 6.94% (n=5) and chronic HTN in 1.38% (n=1). Of the 6 patients with chronic hypertension 50% (3) had essential HTN. Acute renal failure (S. creat > 3 mg/dl) was seen in 7 patients and 4 required dialytic support. Maternal mortality was 5.55% (4) and perinatal death occurred in 37.5% (27) of deliveries. Low birth weight was seen in 66.66% (48) of births. Hypertension complicated 5.38% of all pregnancies in our study. Preeclampsia-eclampsia and its variants remain the major cause of hypertension in pregnant women. Hypertension during pregnancy is responsible for high fetal mortality and low birth weight.

*Professor, **Senior Resident, Department of Nephrology; **Professor, Department of Obstetrics and Gynaecology; Institute of Medical Sciences, Banaras Hindu University, Varanasi - 221 005, India.
Received : 12.7.2005; Accepted : 2.3.2006
b. Preeclampsia superimposed on chronic hypertension
c. Gestational hypertension

**Chronic hypertension**: Hypertension detected prior to conception or diagnosed before the 20th week of gestation. Hypertension diagnosed for the first time during pregnancy which does not resolve post-partum is also defined as chronic hypertension.

**Preeclampsia**: Blood pressure of $\geq 140/90$ mm Hg after 20 week of gestation, if prior blood pressure is unknown and accompanied by proteinuria are considered sufficient for the diagnosis of preeclampsia. The diagnosis of preeclampsia in absence of proteinuria is highly suggestive when hypertension is accompanied by headache, blurring of vision, abdominal pain or certain laboratory abnormalities particularly low platelet count and elevated liver enzyme either alone or in combination.

**Eclampsia**: Occurrence of seizure in women with preeclampsia that cannot be attributed to other causes.

**Superimposed Preeclampsia**
1. In women with hypertension and no proteinuria in early pregnancy (<20 week’s gestation): Documentation of new-onset proteinuria (urinary protein excretion $\geq 0.3$ gm/24 hour).
2. In women with hypertension and proteinuria before 20 weeks gestation, any one of the following will suggest superimposed preeclampsia
   a. Sudden increase in proteinuria
   b. Sudden increase in blood pressure, where hypertension was previously well controlled.
   c. Thrombocytopenia (<10000/mm$^3$)
   d. Rise in serum level of AST/ALT

**Gestational hypertension**: Hypertension detected for the first time after mid-pregnancy but unaccompanied by proteinuria. Blood pressure returns to normal by 6 week postpartum or elevated blood pressure persist to be become chronic hypertension.

**HELLP syndrome**: May occur in 2% to 12% of women with preeclampsia. Diagnosis is based on following criteria

- **Hemolysis** - Peripheral smear showing evidence of hemolysis
  - Bilirubin $> 1.2$ mg/dl
  - LDH $> 600$ U/L

- **Elevated liver enzymes**
  - Serum AST $> 70$ U/L

- **Low platelet count**
  - $< 1,00,000/mm^3$

All pregnant women with hypertension during pregnancy were subjected to detailed history and meticulous clinical examination. Patients were followed upto 6 weeks after delivery when blood pressure and proteinuria generally return to normal if the patient, had preeclampsia-eclampsia. In patients with hypertension persisting for more than 6 weeks, further investigation were conducted to ascertain the cause of hypertension.

Fetal parameters such as gender, birth weight, and survival status (liveborn, stillborn, or perinatal death) were also noted in each patients.

**Laboratory Investigations**:

A. **Hematological** - Hemoglobin, total leukocyte count, reticulocyte count and peripheral blood smear examination.

B. **Biochemical** - Blood urea, serum creatinine, uric acid, electrolytes, SGOT, SGPT, LDH, bilirubin (total and direct), fasting blood glucose and serum total protein and albumin.

C. **Urine analysis** - Urine glucose and 24 hour urine for protein.

D. **Radiologic** - Ultrasound of kidney, ureter and bladder and fetal assessment.

E. **Other investigations** - They were carried as and when required. In patients with chronic hypertension further investigations were done to ascertain the definite cause of hypertension. Doppler study and spiral CT angiography were done in selected cases. Coagulation profile (Bleeding time, clotting time, prothrombin time, APTT, serum fibrinogen) were carried in patients with suspected coagulation disorder. CT scan of cranium was done in patients with encephalopathy.

**RESULTS**

Eighteen hundred and two pregnant women consisting of 750 primigravida and 1052 multigravida were screened for hypertension between July 2000 to June 2002. Hypertension was noted in 97 (5.38%) patients. Twenty five patients were lost to follow up and only 72 patients were included in the final study. Mean age of the patients were 24.75 (range 19-32) years. Majority (51.3%) of the patients were in the age group of 21 to 25 years. Of the 72 patients, 41 were primigravida (57%) and 31 were multigravida (43%). Of the 31 multigravidas, vast majority of patients (84%) were found to be hypertensive in the 3rd trimester only. Five patients (16%) had hypertension in the first trimester. 50% of patients had Stage II hypertension. Stage I and Stage III hypertension were noted in 18% and 32% of patients respectively. Five out of 31 multigravida patients (16%) had a history of hypertension during previous gestations. Preeclampsia was the most common cause of hypertension during pregnancy (44.44%). This was
followed by eclampsia (40.28%). The majority of patients in both these groups were primigravida (27.77% and 26.38% respectively) (Table 1). In 5 patients (6.94%) hypertension was associated with the HELLP syndrome. Chronic hypertension was seen in 6 patients of which superimposed preeclampsia was present in 5 (6.94%) patients. One-half of patients with chronic hypertension had essential hypertension. Obstructive uropathy, renal artery stenosis and reflux nephropathy occurred in one patient each (Table 2).

Oedema was the most common symptom occurring in all the patients. This was followed by headache in 51.39% of patients, seizures in 40.28%, epigastric pain in 27.77% and blurring of vision in 5.5%. Mean proteinuria was 1697.58 ± 1432 mg/day in majority of patients (47.22%) and serum uric acid ranged from 7-10 mg/dl. Majority of patients (76.39%) had a mild rise (35-200 U/L) of AST levels. Small number of patients (5.55%) had a marked rise (> 200 U/L), while 31.94% had normal levels (<35 U/L). Most of the patients (59.72%) had a mild rise in ALT levels (40-200 U/L), 8.33% patients had a marked rise (> 200 U/L), while 31.94% had normal levels (< 40 U/L). LDH levels were normal in majority (73.61%) of the patients though it was markedly elevated in 7 (9.72%) patients of which 5 patients had a HELLP syndrome and in the remaining 16.67% LDH was between 300-600 U/L. 63.91% of patients had normal serum bilirubin level while 5 (6.94%) patients had marked rise of serum bilirubin of which 4 patients had HELLP syndrome. Renal function was normal in 25% of patients while 9.72% patients had severe renal failure with serum creatinine above 3 mg/dl. Majority of the patients had mild renal insufficiency. Four of the 7 patients with advanced renal failure (serum creatinine > 3 mg/dl) required hemodialysis of which 2 patients expired. 83.33% of patients had normal platelet count. It was less than normal in 16.66% of patients and 8 patients (11.11%) had markedly reduced platelet counts. Of these 8 patients 5 had HELLP syndrome and 3 had eclampsia. Fundus changes were divided into 4 grades as per Keith-Wagener-Barker classification. Ophthalmoscopy revealed normal fundus in 73.61%, Grade I changes in 19.44%, Grade II changes in 4.17%, Grade III and Grade IV changes were present in one (1.39%) patient each and both had chronic hypertension.

Preterm delivery occurred in 38.89% of patients and 48 newborn had a low birth weight of < 2500 gm constituting 66.66% of premature delivery, while only 33.33% had normal birth weight. Mean birth weight was 2144.58 ± 628.59 gm (Table 3). 4 (5.55%) patients died and all of them had eclampsia and two of these patients had advanced renal failure requiring dialysis. The cause of death was aspiration pneumonia in 2 patients. Intracerebral hemorrhage and intractable congestive cardiac failure were responsible for death in one patient each.

## DISCUSSION

Over a period of 2 years from July 2000 to June 2002, 1802 pregnancies were screened for hypertension. Ninety seven patients were found to be hypertensive (BP ≥ 140 mm of Hg systolic and ≥ 90 diastolic). Thus, hypertension was seen in 5.38% of pregnancies in our study. Hypertensive disorders complicating pregnancies have been reported in 6 to 8% and may go as high as 20%.6,7 Preeclampsia is a form of hypertension that is unique to pregnancy. The incidence of preeclampsia-eclampsia was 5.47% in primigravida and 2.8% in multigravida in this study. The incidence ranges between 10 and 15% in primigravida and between 5.7 and 7.3% in multiparas.7-10 The incidence is further increased in patients with twin pregnancies and previous preclampsia.31-12 It seems to be low in India because vast majority of our patients are illiterate and have low socio-

---

**Table 1 : Causes of hypertension in pregnancy (n=72)**

<table>
<thead>
<tr>
<th>Para</th>
<th>Preeclampsia</th>
<th>Eclampsia</th>
<th>HELLP syndrome</th>
<th>Ch HTN and Ch HTN syndrome</th>
<th>Ch HTN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Primigravida</td>
<td>20</td>
<td>27.77</td>
<td>19</td>
<td>26.38</td>
<td>1</td>
</tr>
<tr>
<td>Multigravida</td>
<td>12</td>
<td>16.66</td>
<td>10</td>
<td>13.88</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>44.44</td>
<td>29</td>
<td>40.28</td>
<td>5</td>
</tr>
</tbody>
</table>

**Table 2 : Chronic hypertension in pregnancy (n=6)**

<table>
<thead>
<tr>
<th>Cause</th>
<th>No. of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essential hypertension</td>
<td>3</td>
<td>4.17</td>
</tr>
<tr>
<td>Obstructive uropathy</td>
<td>1</td>
<td>1.39</td>
</tr>
<tr>
<td>Renal artery stenosis</td>
<td>1</td>
<td>1.39</td>
</tr>
<tr>
<td>Reflux nephropathy</td>
<td>2</td>
<td>1.39</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>8.33</td>
</tr>
</tbody>
</table>

**Table 3 : Fetal outcome**

<table>
<thead>
<tr>
<th>Events</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live birth</td>
<td>45 (62.5)</td>
</tr>
<tr>
<td>Stillborn</td>
<td>23 (31.94)</td>
</tr>
<tr>
<td>Postnatal death</td>
<td>4 (5.55)</td>
</tr>
<tr>
<td>Birth weight (grams)</td>
<td></td>
</tr>
<tr>
<td>&gt; 1000</td>
<td>4 (5.55)</td>
</tr>
<tr>
<td>1000-2500</td>
<td>44 (61.11)</td>
</tr>
<tr>
<td>≥ 25000</td>
<td>24 (33.33)</td>
</tr>
</tbody>
</table>
of serious problems, and in a large majority of patients preeclampsia remains asymptomatic and remits spontaneously, since diagnosis of preeclampsia is often missed. Hence these patients never come in contact with the health care system and do not figure in the statistical analysis. There are many reported predisposing factors related to preeclampsia: maternal age, familial aggregation, race, smoking, socio-economic level, diet, seasons and climatic and geographical area. Risk factors like chronic hypertension, family history of preeclampsia and renal disease were observed in a small number of patients in our study.

Of the 72 patients, 44.44% (n=32) had preeclampsia, 40.28% (n=29) had eclampsia, 6.94% (n=5) had HELLP syndrome, 6.94% (n=5) had chronic hypertension with superimposed preeclampsia and 1.38% (n=1) had chronic hypertension alone. Thus, in 91.66% (n=66) of patients preeclampsia and its variants were the cause of hypertension while in the remaining 8.33% (n=6) chronic hypertension with or without superimposed preeclampsia was the cause. Pregnancy induced hypertension and chronic hypertension were responsible for hypertension in 96% and 4% of cases respectively in an Indian study. The prevalence of chronic hypertension in pregnancy varies between 1% to 5% depending upon diagnostic criteria used. Chronic hypertension was noted in 8.33% of patients in this study. This shows that preeclampsia-eclampsia is the dominant cause of hypertension in pregnant population while chronic hypertension is seen in a small number of patients. Thus, our observation regarding prevalence and distribution of hypertension in pregnant women was similar to other studies. Of the 6 patients with chronic hypertension 83.55% (n=5) had superimposed preeclampsia suggesting that chronic hypertension poses a high risk of developing superimposed preeclampsia as observed by others. Of the 6 patients with chronic hypertension 3 patients (50%) had essential hypertension, while one each had obstructive uropathy, renal artery stenosis and reflux nephropathy. The number of patients is very small to come to a definitive conclusion, however essential hypertension is reported to be the predominant form of chronic hypertension in hypertensive pregnant women and it may be the cause in as high as 90%. Maternal risks associated with chronic hypertension include superimposed preeclampsia, deterioration of renal function, cerebrovascular accident, congestive heart failure and hemorrhage secondary to placental abruption. These events are very unusual in pregnant women with mild chronic hypertension, and are more often seen in patients with severe degree of hypertension. There is considerable disagreement regarding the incidence of superimposed preeclampsia in patients with chronic hypertension. Reported incidence has ranged from 4.7 to 52% with differences related to population studied, severity of hypertension at the time of pregnancy, and the diagnostic criteria used for superimposed preeclampsia. Patients with undiagnosed chronic renal disease may experience superimposed preeclampsia with advancing gestation, particularly in the 3rd trimester. The reported incidence of superimposed preeclampsia varies with severity of blood pressure and stage of pregnancy. The incidence may approach as high as 28-52% in patients with severe hypertension in 1st trimester and as low as 4-7% in patients with mild hypertension in early pregnancy. Very high incidence of superimposed preeclampsia in our study is possibly related to severity of hypertension.

Oedema was the most common symptom and seen in 100% of our patients. Oedema is a very common manifestation and is seen in up to 80% of normal pregnancies and also seen invariably in patients with preeclampsia-eclampsia. Headache occurred in 51.39%, seizure in 40.28%, epigastric pain in 27.77% and blurring of vision in 5.5% patients. Proteinuria above the upper limits of normal for pregnancy (< 300 mg/day) was seen in 98.61% of patients. Mean proteinuria was 1697.58 ± 1432 mg/day and majority (69.44%) of patients had moderate (500-2000 mg/day) degree of proteinuria. Proteinuria > 2 gm/day was seen in 25% (18 of 72) patients while 6.94% (5 of 72) had nephrotic range proteinuria. Serum uric acid levels was raised in all the cases (100%) above the normal pregnancy levels of < 4 mg/dl and in majority (47.22%) of the patients it was in the range of 7-10 mg/dl. Because of plasma volume expansion that occurs during normal pregnancy, serum uric acid levels are between 2.5 and 4 mg/dl in normal pregnancy. A serum uric acid level greater than 5.5 mg/dl is consistent with preeclampsia, and values exceeding 6.0 mg/dl suggest more serious disease. When liver dysfunction occurs, mild elevation of serum transaminases is common. We have noted elevated SGOT in 82% and SGPT in 68% of patients with preeclampsia. Bilirubin is rarely increased in patients with preeclampsia, but when elevated the indirect fraction predominates suggesting hemolysis related elevation of bilirubin. Rise is serum bilirubin especially if associated with increased serum LDH (> 600 U/L) is highly suggestive of HELLP syndrome. We observed increased serum bilirubin levels above the normal level for pregnancy (1.2 mg/dl) in 26 (36%) patients and above 2.4 mg/dl in 5 cases.

The HELLP syndrome consists of hemolysis, elevated, liver enzymes and low platelet count in the face of severe preeclampsia. The incidence of HELLP syndrome in preeclampsia has ranged from 2-12%. However, the true incidence is not known because of the differences in the diagnostic criteria. It should be noted that severe hypertension is not a common in HELLP syndrome. Sibai et al studied a group of 112 patients and they found
that 60% had a diastolic blood pressure of 110 mm of Hg and 45% less than 90 mm Hg. The HELLP syndrome may develop antepartum or post partum. In the postpartum period, the time of onset of manifestations ranged from a few hours to 7 days, with the majority developing within 48 hours postpartum. Patients with HELLP syndrome did not have increased incidence of maternal complications in large series of patients. Conservative treatment is recommended in order to delay the time of delivery in such patients by most workers. The HELLP syndrome was observed in 7.5% of patients with preeclampsia in the present study. No maternal mortality occurred in them. Thrombocytopenia was seen in 12 of 66 patients. Thrombocytopenia (< 100,000/cu mm) is the most common hematologic abnormality in women with preeclampsia among the various reports. Acute renal failure was seen in 7 patients and 4 patients needed dialysis support. Mortality was noted in 2 patients with acute renal failure. Both of them had eclampsia and death was attributed to cerebral hemorrhage in one and aspiration pneumonia in the other patient.

Fetal and neonatal outcome of chronic hypertension include increased prevalence of IUGR (intrauterine growth retardation), prematurity and perinatal mortality. The incidence of IUGR was reported to be 10%, 12%, 18% and 52% in women with control, chronic hypertension, gestational hypertension and preeclampsia respectively.21 Preterm delivery in 28.8% stillbirths in 4.8% and overall perinatal mortality of 14.8% were reported in an Indian study. The same authors have noted higher frequency of adverse foetal outcome in hypertensive pregnant women as compared to normotensive pregnant women. Perinatal complications in a study of 76 pregnancies complicated by hypertension included; preterm delivery (34%), low birth weight (19.9%), IUFD (11.2%), IUGR (6.6%) and neonatal deaths in 3.8%.29 Preterm delivery occurred in 38.89% of our patients. 66.66% of the fetuses had low birth weight. Of the total deliveries; 62.5% (45) resulted in live births, 31.94% (23) in still births and 5.55% in postnatal deaths. Thus, an adverse fetal outcome was seen in 37.5% of deliveries which is similar to observations made by Eskes TK who found 38% fetal loss in first hypertensive pregnancy.30 The mortality of infants of women with preeclampsia is five times the normal perinatal mortality, and this increases to 20% in the infants of eclamptic women.16 The risk of severe growth retardation (birth weight < 10th percentile) ranges from 5% to 13%; the risk for premature delivery is 13% to 54% depending on the gestational age at which preeclampsia develops.16 Fetal morbidity and mortality are highest in women with eclampsia, the HELLP syndrome and preeclampsia beginning before 34 weeks of gestation. Maternal mortality was seen in 4 (5.55%) patients all of them had eclampsia and two of them had associated ARF requiring dialysis. Eskes TK noted 13 maternal deaths in 301 hypertensive pregnancies (4.32%).30 The mortality of women with eclampsia ranges from 2% to 5% and we have found similar results. The causes of death were intracerebral hemorrhage (1), aspiration pneumonia (2) and intractable congestive cardiac failure in (1) patient.

Thus, preeclampsia is the most common cause (91.7%) of hypertension in Indian Pregnant Population and chronic hypertension account for only in minority (8.3%) of patients. Hypertension during pregnancy is associated with several adverse fetal outcome and carry maternal mortality of 5.5%.

REFERENCES

15. Anonymous. National high blood pressure education program working group report on high blood pressure in...


**Announcement**

**ICAAICON-2006**

40th National Conference on Allergy, Asthma and Applied Immunology, 7th - 10th December 2006 at Desh Bhagat Yaadgar Hall, Jalandhar.

Organising Secretary: Dr. HJ Singh, Ranjit Hospital, Patel Chowk, Jalandhar

Tel: 0181-2620600 Fax:2620700; Cell: 09814217738   email: drhj@sify.com

website: www.ICAAICON2006.com