



Maternal and Fetal Outcome of Pregnancies Complicated with Hypertension in a Tertiary Care Hospital in Eastern Nepal

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Authors' contributions

This work was carried out in collaboration among all authors. Author RJ designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors DKU and AT managed the analyses of the study. Author MC managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

A cross sectional study was conducted between March 2011 and August 2011 at B. P. Koirala Institute of Health Sciences (BPKIHS). All women delivering at BPKIHS whose pregnancies were complicated by hypertensive disorders were identified. Their demographic profile including age, parity, clinical presentation, laboratory investigations, mode of delivery, requirement of drug therapy, maternal complications, birth outcome and blood pressure at discharge was noted. The patients were followed up over the next 6 months for their delivery in the hospital and their outcomes ascertained.

Objectives: To study maternal and fetal morbidities and mortality in patients with hypertensive disorders in pregnancy.

Study Design: Descriptive cross sectional study.

Place and Duration of Study: Department of Obstetrics and Gynecology, B. P. Koirala institute of health sciences (BPKIHS) between March 2011 to August 2011.

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Materials and Methods: All pregnant patients with hypertension admitted during the study period were enrolled in the study and followed up till delivery. Clinical and laboratory parameters were used to stratify the type of hypertension. Maternal outcome identified were pulmonary edema, acute renal failure, HELLP(hemolysis, elevated liver enzymes, low platelet), ascites, DIC(disseminated intravascular coagulation),seizures, PPH(postpartum hemorrhage), abruptio and death. Fetal outcomes studied were birth weight, presence of IUGR, 5min Apgar score, ante or intrapartum death and admission to ICU or neonatal ward.

Results: 2.4% of total deliveries were complicated by hypertension. There were 36.5% of patients with non-severe /mild preeclampsia, 53.1% severe preeclampsia and 10.4% gestational hypertension. It was seen that 45% of the patients needed induction of labour. 46.9% of patients delivered vaginally while 44.8% underwent cesarean section. The maternal complications found were as follows: 21.9% patients had ascites, 15.6% seizures, 13.5% postpartum hemorrhage, 7.3% abruptio, 4.2% each had acute renal failure and acute pulmonary edema, 2.1% HELLP syndrome and 1% DIC. There was significant association between the complications like ascites, postpartum hemorrhage seizures and abruptio and the severity of hypertension. Among the total deliveries, 40.6% were preterm and 50% were low birth weight. 21.9% were small for gestational age. The 5 minute Apgar score was more than 7 for 77.9% of the babies.11.5% babies had ante/intrapartum death. 4.8% of the babies were admitted in the intensive care unit and 23.1% were admitted in the pediatric ward.

Conclusion: Hypertensive disorders in pregnancy are associated with significant maternal and fetal morbidity and mortality and hence deserve due concern in obstetric practice.

Keywords: Hypertension; fetal outcome; maternal outcomes; preeclampsia.

1. INTRODUCTION

Nepal has met the standards of the millennium development goals of reducing the maternal mortality rate by 76% from 1990 to 2013. A 2013 WHO review quoted Nepal's maternal mortality rate to be 190 per 100000 live births [1]. There is still much to be done, as globally, maternal death is the only public health statistic with the largest disparity between high-income and low-income countries [2].

Hypertensive disorders in pregnancy rank second only to hemorrhage as the direct cause of maternal mortality in Nepal according to the summary of the preliminary findings of the Nepal maternal mortality and morbidity study 2008/2009. In fact, eclampsia was found to be the leading cause of hospital related deaths accounting for nearly 30%. However, most of the major complications of hypertensive disorders leading to severe maternal outcomes, including deaths and severe morbidities, are preventable and treatable.

In view of the significant burden on maternal morbidity and mortality due to hypertensive disorders in pregnancy in Nepal, this study is an effort to identify the overall impact on maternal health due to hypertension in the eastern region of Nepal.

2. MATERIALS AND METHODS

A cross sectional study was conducted between March 2011 and August 2011 at B. P. Koirala Institute of Health Sciences (BPKIHS). The patients were followed up over the next 6 months for their delivery in the hospital and their outcomes ascertained. The study was started after clearance from the Institutional ethical review committee. Data was entered into excel sheet and analysis was done using SPSS-version 11.5 software. Categorical data were analyzed with chi square test, continuous data with t-test and non-normal continuous data were analyzed with Mann-Whitney U test. p value< 0.05 was considered to be statistically significant. The values have been expressed as Mean \pm Standard Deviation or Median (Inter-quartile Range) whichever applicable.

3. RESULTS AND DISCUSSION

There were a total of 96 patients with hypertension in pregnancy out of total 3959 deliveries in the study period with a prevalence of 2.41%. The mean age of the patients was 25.4 \pm 4.8 years. 53.1%(n=51) patients had severe preeclampsia and eclampsia while 36.4%(n=35) patients had mild disease and 10.4%(n=10) patients had gestational hypertension only.

Among 96 patients delivered in the hospital, 53.1% (n=51) were primigravida. There were 8 patients with multiple pregnancy, 2 patients had coexisting diabetes mellitus while 8 had a family history of hypertension.

Among the investigations, anemia, deranged liver function tests and renal function tests were found to be significantly associated with the severity of hypertension as shown in Table 1.

There were various maternal morbidities identified during the study period including a single case of maternal mortality in the severe preeclampsia/eclampsia group. However, only ascites, postpartum hemorrhage, seizures and abruption were found to be statistically significant as shown in Table 2

Table 3 shows the mode of delivery, requirement of induction and duration of stay in the maternal intensive care unit in all the groups. The

requirement of induction of labour was also significantly more for severe disease.

The mean birth weight of babies was less than 2.5 kg in the nonsevere and gestational hypertension group while it was 2.01 kg in the severe/eclampsia group. There were a total of 58 female and 46 male babies. Other fetal morbidities are as shown in Table 4.

3.1 Discussion

The global burden of hypertension in pregnancy is variable ranging from 1% in Angola to 8% in Brazil [3]. The hospital based incidence of this study was found to be 2.4 % which is comparable to that by the WHO Global survey on maternal and perinatal health(2.18%) [3] Other studies in Nepal also quote a comparable incidence of 1.8% in Paropakar maternity and women’s hospital and 1.5% in Koshi Zonal hospital [4,5].

Table 1. Investigation profile of patients

		Non severe /Mild preeclampsia (n=35)	Severe preeclampsia/ Eclampsia (n=51)	Gestational hypertension (n=10)	p value
Hemoglobin(gm/dl)	<8	2	19	2	0.010
	8 to 10	10	12	1	
	>10	23	20	7	
Platelet	Normal	32	42	10	0.206
	Decreased	3	9	0	
PT/INR	Normal	10	22	2	0.214
	Deranged	25	29	8	
RFT	Normal	35	44	10	0.036
	Deranged	0	7	0	
LFT	Normal	29	34	10	0.039
	Deranged	6	17	0	

p-value less than 0.05 taken as statistically significant

Table 2. Pattern of maternal complications in PIH

Maternal complications	Non severe /Mild preeclampsia (n=35)	Severe preeclampsia/ Eclampsia (n=51)	Gestational hypertension (n=10)	p-value
Acute pulmonary edema	0	7.8%(n=4)	0	0.159
Acute Renal Failure	0	7.8%(n=4)	0	0.159
HELLP	0	3.9%(n=2)	0	0.406
Ascites	0	41.1%(n=21)	0	<0.001
DIC	0	1.9%(n=1)	0	0.064
Seizures	0	27.4%(n=14)	10%(n=1)	0.002
PPH	0	25.4%(n=13)	0	0.001
Abruption	0	13.7%(n=7)	0	0.036
Death	0	1.96%(n=1)	0	0.640

p-value less than 0.05 taken as statistically significant

Table 3. Mode of delivery, induction of labour and ICU stay

		Non severe /Mild preeclampsia (n=35)	Severe preeclampsia/ Eclampsia (n=51)	Gestational hypertension (n=10)	p- value
Mode of delivery	Vaginal	60%(n=21)	43.1%(n=22)	20%(n=2)	0.839
	Assisted	5.7%(n=2)	11.8%(n= 6)	0%(n=0)	
	Operative	34.3%(n=12)	45.1%(n=23)	80%(n=8)	
MICU stay	Yes	2.9%(n=1)	23.5%(n=12)	0%(n=0)	0.076
	No	97.1%(n=34)	76.5%(n=39)	100%(n=10)	
Induction of labour	Yes	48.6%(n=17)	43.1%(n=22)	40%(n=4)	0.009
	No	51.4%(n=18)	56.9%(n=29)	60%(n=6)	

p-value less than 0.05 taken as statistically significant

Table 4. Pattern of fetal complications

		Non severe /Mild preeclampsia (n=35)	Severe preeclampsia/ Eclampsia (n=51)	Gestational hypertension (n=10)	p-value
Mean birth weight in kg±S.D.		2.39±0.75	2.01±0.74	2.26±0.67	0.049
Birth weight	SGA	8	12	3	0.716
	AGA	25	44	7	
	LGA	3	2	0	
Gender	Female	21	30	7	
	Male	15	28	3	
Fetal outcome	IUFD	2	10	0	0.113
	Ward admission	5	16	3	
	ICU	1	4	0	
	No admission`	28	28	7	
Mean 5 min Apgar score		8.5±0.82	8.35±0.96	8.2±0.14	0.541

p-value less than 0.05 taken as statistically significant

There have been various associations about extremes of age groups being linked with hypertensive disorders of pregnancy. Although preeclampsia/ eclampsia has been strongly associated with age being more than 35 years in various studies [6,7], our study found no significant association of age with respect to development of hypertension in pregnancy. This may be attributed to the fact that women in our part of the world start their reproductive journey earlier.

The mean age of the patients in the study was found to be 25.4± 4.8 years nearly similar to the mean age of the patients with eclampsia (23.4±0.5 years) in a retrospective study done in BPKIHS from June 2000 to June 2003 by Chuni et. al. [8] A prospective multicentre study in 2947 healthy nulliparous women in various Maternal- fetal Medicine units in United States showed higher maternal age as a significant risk factor for the development of preeclampsia and thus a useful predictor of the disease [9].

Preeclampsia occurs at higher rates in sisters, daughters and mothers of affected women. Carr et. al in their analysis of 1071 preeclamptic women showed that women with preeclampsia were 2.3 times more likely to have a sister who had preeclampsia [10]. In a case control study of severe preeclampsia done in Brazil it was found that women whose mothers had a history of hypertension (p= 0.003), preeclampsia (p= 0.007) or eclampsia (p= 0.038) were at increased risk of severe preeclampsia. The risk of preeclampsia was greater when the woman had a sister with a history of hypertension (OR 2.60, 95% CI 1.60–4.21, p < 0.001), preeclampsia (OR 2.33, 95% CI 1.58–3.45, p < 0.001), or eclampsia (OR 2.57, 95% CI 1.28–5.16, p= 0.008). The risk of preeclampsia was also higher for women who had both a mother and sister with a history of hypertension (OR 3.65, 95% CI 1.65–8.09, p= 0.001) [11] As this study was not a case control study the significance of the association of family history with hypertension could not be ascertained; however, on bivariate analysis a positive family history was not independently

found to have a significant association with the type of hypertensive disease. In addition, inadequate knowledge of the patient about their first degree relatives having hypertension especially preeclampsia might also have led to the result of only 11 patients having a positive family history.

There are conflicting reports about the association of anemia with preeclampsia. Gonzales et al in their retrospective cohort study published in May 2012 showed that the risk of pre-eclampsia increased at maternal hemoglobin levels above 14.5 g/dl (OR 1.27; 95% CI, 1.18-1.36) or below 7.0 g/dl (OR 1.52; 95% CI, 1.08-2.14) [12]. In contrast, Kashanian et al in their retrospective case control study in Teheran, found that anemia was protective of preeclampsia ($P=0.01$) [13]. In this study however the difficulty of ascribing anemia as a predictor of anemia arose as most patients were unbooked with no previous reports of hemoglobin levels done and the hemoglobin level taken into consideration was the lowest one recorded during their hospital stay. However, the results show that low hemoglobin levels were significantly associated with severe preeclampsia.

The maternal complications of hypertensive disorders in pregnancy in our study were found to be as follows: ascites 21.9%, seizures 15.6%, postpartum hemorrhage 13.5%, MICU admission 13.5%, abruptio 7.3%, acute pulmonary edema 4.2%, acute renal failure 4.2%, HELLP 2.1%, disseminated intravascular coagulation 1% and maternal mortality 1%. This is consistent with the findings of de Swiet et al who recognized ascites in 13 of 99 patients with hypertension though rarely reported in other studies [14].

The maternal morbidities seen in the cross-sectional analytical study in South Africa included: pulmonary oedema (3.9%), abruptio placentae (1.7%), HELLP syndrome (1.2%), maternal death (1.0%), acute renal failure (0.9%), coma with cerebral pathology (0.5%), and DIC (0.5%) [15]. Sibai et al in their descriptive study of 399 women with eclampsia found major maternal complications to be abruptio placentae (10%), HELLP (hemolysis, elevated liver enzymes, and low platelet count) syndrome (11%), disseminated intravascular coagulopathy (6%), neurologic deficits and aspiration pneumonia (7%), pulmonary edema (5%), cardiopulmonary arrest (4%), acute renal failure (4%), and death (1%) [16]. In the previous study done by Chuni et al at BPKHS to study the risk factors in

relation to eclampsia in Nepal, maternal morbidity showed that pulmonary edema (9.01%) and disseminated intravascular coagulation (8.19%) were most common complications. [8] In a systematic review and metaanalysis of hypertensive disorders in pregnancy in Ethiopia, the pooled prevalence of HELLP syndrome was found to be 13% [17]. In follow up, complication related to Gestational Trophoblastic Disease (GTD) are to be looked for. Usually patients clinically have a history of vaginal bleeding, often with symptoms of toxemia [18].

The modes of delivery in women with hypertensive disorders of pregnancy were: 46.9% vaginal delivery, 44.8% cesarean delivery and 8.3% assisted vaginal delivery. Yadav et al in their case control study also found that the cesarean section rate in hypertensive women was 14.8% compared to 3.5% in controls [19]. This predilection for more cesarean section may have been because of more referral cases requiring operative intervention.

72.9% of the newborns were appropriate for gestational age while only 21.9% were small for gestational age. The mean birth weight of babies born to mothers with severe preeclampsia was significantly lower compared to those born to mothers with gestational hypertension or mild preeclampsia group. This is comparable to a retrospective descriptive study done in northeast Thailand in which neonatal complications were significantly higher in the preeclampsia with severe features and HELLP syndrome group (low birth weight = 35.1% versus 74.3%, $p, 0.001$) [20]. The 5 minute Apgar score of babies born to mothers with all types of hypertension was not significant; there being 12 intrauterine/intrapartum deaths. Perinatal complications recorded in an East African journal included preterm delivery (34%), low birthweight (19.9%), intrauterine fetal death (11.2%), intrauterine growth restriction (6.6%), and neonatal deaths (3.8%) [15]. However in our study, the preterm delivery rate was 40.6% and intrauterine / intrapartum death rate was 12.5% comparable to the above study, but intrauterine growth restriction was much higher 21.9%.

4. CONCLUSION

The prevalence of hypertensive disorders in pregnancy was found to be 2.4%. Hypertensive disorders in pregnancy are associated with significant maternal as well as fetal morbidities and mortality.

5. LIMITATIONS OF THE STUDY

The overall prevalence may actually have been underreported as few patients who were enrolled on their admission for control of high blood pressure and discharged to follow-up, failed to deliver at our hospital during the study period. In addition to this, the short duration of study time of 6 months might have led to an overall small sample size. The high admission rates of patients in a busy antenatal ward also might have contributed indirectly to this as many booked patients with hypertension are managed on an outpatient basis and admitted only at the time of delivery or as needed.

Some patients who developed hypertension in the postpartum period refused investigations and treatment for hypertension and left against medical advice. This is also one of the setbacks encountered in a resource-poor country like ours where all the burden of investigations is solely borne by the patient.

CONSENT

All women delivering at BPKIHS whose pregnancies were complicated by hypertensive disorders were identified. Informed consent was taken from all women. Their demographic profile including age, parity, clinical presentation, laboratory investigations, mode of delivery, requirement of drug therapy, maternal complications, birth outcome and blood pressure at discharge was noted.

ETHICAL APPROVAL

The study was started after clearance from the Institutional ethical review committee. Data was entered into excel sheet and analysis was done using SPSS-version 11.5 software. p value < 0.05 was considered to be statistically significant. The values have been expressed as Mean \pm Standard Deviation or Median (Inter-quartile Range) whichever applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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