Original Article

Comparison of the efficacy of intravenous labetalol versus oral nifedipine in patients with severe pregnancy-induced hypertension beyond 30 weeks of gestation

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ABSTRACT

Hypertensive disorders of pregnancy affect 5% to 10% of all pregnancies globally. The aim of treatment is to bring down blood pressure (BP) quickly and smoothly, which is safe for the mother and baby. The aim of our study was to study the efficacy and safety of intravenous labetalol and oral nifedipine in severe pregnancy-induced hypertension. **Materials and Methods:** It is a retrospective observational study, intravenous labetalol 20 mg was given initially in escalating doses of 40 mg, 80 mg, 80 mg, and 80 mg every 15 mins up to a maximum dose of 5 or until the goal BP ≤150/100 mmHg was reached. Some women with severe pregnancy-induced hypertension were given oral nifedipine to control their BP according to the choice of the attending consultant. Nifedipine 10 mg tablet was given initially in repeated doses of 10 mg every 15 mins up to a maximum of five doses or until the goal of BP ≤150/100 mmHg was reached. **Results:** In our study, we found that there was a strong statistical significance in stabilizing the BP with oral nifedipine than with intravenous labetalol drug used. The majority of the patients in the oral nifedipine group got to normal BP quicker when compared to intravenous labetalol group patients. **Conclusion:** From this study, both drugs were found to be safe and effective in the reduction in BP. The use of nifedipine may be recommended in low-resource settings since it has an oral regimen and dosage is simple when compared to incremental intravenous dosing of labetalol.

Keywords: Comparison, hypertension in pregnancy, labetalol, nifedipine

Introduction

Hypertension in pregnancy is one of the components of the dangerous triad—along with bleeding and infection. Hypertensive disorders of pregnancy affect 5% to 10% of all pregnancies globally.[1] In a study population in India, the prevalence of hypertensive disorders of pregnancy was found to be 7.8% and pre-eclampsia to be 5.4%.[2]

There is consensus that sustained severe hypertension should be treated as it is considered to be a risk factor for maternal end-organ complications such as stroke, intracranial hemorrhage, cardiopulmonary decompensation, and fetal decompensation due to decreased uterine perfusion, abruption, and stillbirth.[3] The

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Table 1: Blood pressure vs drugs

Blood pressure	BP at admission		BP after 15 mins		BP after 30 mins		BP after 45 mins		BP after 60 mins	
	<140/90	>140/90	<140/90	>140/90	<140/90	>140/90	<140/90	>140/90	<140/90	>140/90
Inj. labetalol	0	30	0	30	9	21	20	10	26	3
Oral nifedipine	0	30	8	22	19	3	29	1	29	1
Total	0	60	11	49	28	24	49	11	55	4
χ^2	-		9.231		25.071		22.954		9.453	
P	-		0.002**		<0.001**		<0.001**		0.009	

Chi-square test

Table 2: Neonatal parameters vs drugs used

Neonatal parameters		*n*	Mean	Std. deviation	*t*	Sig. (2-tailed)
Baby weight	Inj. labetalol	30	2.55450	0.517718	0.653	0.516
	Oral nifedipine	30	2.45177	0.694361		

t-test

Table 3: Baby details vs drugs used

Baby details NICU admission	Drug used		Total	χ^2	*P*
	Inj. labetalol	Oral nifedipine			
Mother's side	26	22	48	2.241	0.118
NICU	4	9	13		
Total	30	30	60		

Chi-square test

aim of treatment is to bring down blood pressure (BP) quickly and smoothly, which is safe for the mother and baby.[4]

Several drugs are available to rapidly lower BP in case of hypertensive emergencies of pregnancy. The three most commonly employed are labetalol, nifedipine, and hydralazine. All three of these are recommended as first-line agents.[5] According to Cochrane's evaluation of medications for treating very high BP during pregnancy, the selection of an antihypertensive should be based on the clinician's experience and familiarity with the medication in question and what is known about potential side effects.[6]

In the entire Northeast of India, the prevalence of eclampsia was found to be 7.5%. In the state of Meghalaya, the prevalence of eclampsia was found to be 6.3% in urban and 9.6% in rural populations.[7,8] According to a prospective hospital-based study conducted in Northeast India from January 2016 to January 2019, it was found that 7.4% of the pregnancies had developed hypertensive disorders of pregnancy, 27.6% of the pregnant women were found to have developed gestational hypertension and equal percentage of pregnant women had been found to have developed mild pre-eclampsia, 33.6% of the study population had developed severe pre-eclampsia, and 11.2% of the women had eclampsia. The morbidity associated is also high with hypertensive disorders of pregnancy as indicated by 13.4% admissions in the intensive care unit. A mortality of 2.9% was found of which 66.6% was due to cerebral hemorrhage and 33.3% was accounted by pulmonary edema.[9]

The aim is to study the efficacy and safety of intravenous labetalol and oral nifedipine in severe pregnancy-induced hypertension.

Materials and Methods

It is a retrospective observational study. The study was conducted on patients with severe pregnancy-induced hypertension who were admitted to the labor room of the Obstetrics and Gynaecology Department, NEIGRIHMS, Shillong, from June 2020 to June 2021.

Intravenous labetalol 20 mg was given initially, with escalating doses of 40 mg, 80 mg, 80 mg, and 80 mg every 15 mins up to a maximum dose of 5 or until the goal BP ≤150/100 mmHg was reached. Some women with severe pregnancy-induced hypertension were given oral nifedipine to control their BP, as per the choice of the attending consultant. Nifedipine 10 mg tablet was given initially in repeated doses of 10 mg every 15 mins up to a maximum of five doses or until the target BP ≤150/100 mmHg was reached. BP was measured every 15 mins for at least 60 min or longer until the target BP was achieved. All relevant treatment data were collected from the record and case sheets. After successful control of BP, further antihypertensive therapy was started two hours after the last trial medication.

A profile of maternal side effects was kept. Maternal and fetal heart rates were checked every 15 minutes throughout the trial. When the fetal state was unsatisfactory and maternal problems such as hypotension or chest discomfort appeared, the trial was stopped. Neonatal admission rates and neonatal complications were recorded.

Statistical analysis

Using Statistical Package for the Social Sciences (SPSS) version 20 software, all the data were systematically recorded onto a predetermined data information sheet. The Chi-square test and Student's *t*-test were each used to evaluate differences in categorical and continuous data. When the *P* value was less than 0.05, the statistical test was deemed significant.

Results

Number of doses to control BP

In our retrospective observational study, three doses of injection labetalol were required to control the BP of the patients, while

the majority of the patients in the oral nifedipine group required two doses to control the BP except for one case, which needed five doses [Figure 1].

In our study, we found that there was a strong statistical significance in stabilizing the BP with oral nifedipine than with intravenous labetalol drug used. The majority of the patients in the oral nifedipine group got to normal BP quicker when compared to intravenous labetalol group patients ($P = 0.002$) [Table 1].

Discussion

Analysis of demographic factors

Age: Among 60 women, about 41.67% of cases of pre-eclampsia were seen in the age group of 26 to 30 years (P value: 0.024). Similar results were found in the study conducted by Scandiuzzi *et al.*—67% of women belonged to the age group between 21 and 34 years.[10]

Gravida: About 51.67% of the women under study were primigravida, and 48.34% were multigravida women. Scandiuzzi *et al.* found that 47% of the women belonged to primigravida.[10]

Socioeconomic Status: The prevalence of severe pre-eclampsia was high in women with low-class status (66.67%) followed by the middle class (28.34%). Similar to our result, the prevalence of eclampsia according to Agarwal *et al.'s* study group was 9.6% in women belonging to the rural population compared with 6.3% in the urban population, in the state of Meghalaya.[11,12]

Body Mass Index (BMI): About 65% of the women enrolled in the labetalol and nifedipine groups were categorized as overweight followed by 31.67% of women with obese. Similar to our result, Sibai BM *et al.* said that the risk was increased by 13.3% in women with BMI of more than 35 kg/m^2.[13]

Analysis of number of doses to control BP

In our retrospective observational study, of the 30 patients enrolled in the labetalol group, 22 patients, constituting 73.33% of the study population, achieved the target BP within 45 minutes of the commencement of the treatment, requiring

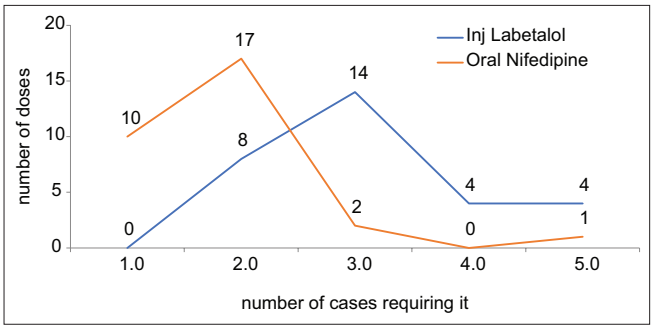

Figure 1: Line chart depicting the distribution in terms of number of doses to control BP

two incremental doses of intravenous labetalol. The total dose administered in the labetalol group was 140 mg. In the nifedipine group, 90% of the enrolled patients required two doses of oral nifedipine in 30 minutes constituting a dose of 30 mg. There was a strong statistical significance in stabilizing the BP with oral nifedipine than with the intravenous labetalol drug used. The majority of the patients in the oral nifedipine group got normal BP quicker when compared to intravenous labetalol group patients. The findings were similar to the results mentioned in studies conducted by Zulfeen M *et al.*[14]

Failure to control BP

In our study, four patients in total, three in the labetalol group, and one in the nifedipine group, comprising 6.66% of the enrolled patients in the study group, had uncontrolled BP with a maximum of five escalating doses, respectively. In view of uncontrolled BP, the decision of delivery was taken by the doctor on duty. One went into spontaneous vaginal delivery (VD), and three of the patients ended with cesarean section. No cross-over treatment was done.

Side effects

On the whole, there was no statistically significant difference in adverse effects between the groups in our study. None of the patients had hypotensive episodes. The minimum BP recorded during the study was 130/80 mm Hg in both groups. Similar to our study, Vermilion *et al.* found infrequent adverse effects.[15]

Mode of delivery

In our study, 51.67% of mothers had VD, whereas 48.33% had lower segment cesarean section (LSCS). No significant analysis was found in the analysis of the data. Indications of cesarean delivery were maximum (34.49%) with severe oligohydramnios. Similar to our result, Duro-Gómez J *et al.* also found no major differences according to the type of delivery.[16]

Induction of labor

In our study, 77.42% of the VD cases were induced, except for seven cases who had spontaneous normal delivery. Induction with dinoprostone gel and augmentation with oxytocin to expedite delivery were done once BP was controlled. Cardiotocographic abnormalities were not linked to the usage of either medication. In a study conducted by Alanis *et al.*, it was found that induction of labor and VD was not associated with adverse neonatal outcome in women with severe pregnancy-induced hypertension.[17]

Baby birth weight

In our study, 57.39% of babies weighed below 2 kg. A similar study conducted by Prakash J *et al.* found that low birth weight babies were 66.66% in women with pregnancy-induced hypertension.[18] Their study also added that hypertension during pregnancy was responsible for high fetal mortality [Tables 2 and 3].

Prophylactic magnesium sulfate therapy

All the patients enrolled in our study received prophylactic magnesium sulfate therapy. None of the patients developed

eclampsia in antepartum or postpartum periods. None of the patients receiving both drugs developed hypotension or neuromuscular blockade. Similar to our results, the Magpie trial found that prophylactic magnesium sulfate therapy reduced the risk of eclampsia by 58% compared with placebo, with both labetalol and nifedipine.[19,20]

Conclusion

From the present study, both drugs were found to be safe and effective in the reduction in BP. None of the drugs were associated with any detrimental maternal or fetal outcomes with respect to antihypertensive usage. The tolerance of the patients toward both drugs was similar. The use of nifedipine may be recommended in low-resource settings since it has an oral regimen and dosage is simple when compared to incremental intravenous dosing of labetalol.

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Conflicts of interest

There are no conflicts of interest.

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