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RESEARCH ARTICLE

Comparative study of labetalol and nifedipine in management of hypertensive disorders of pregnancy in BRIMS tertiary care center

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ABSTRACT

Objective: To compare the efficacy and safety of oral labetalol and nifedipine in hypertensive disorder of pregnancy. **Methods:** A prospective comparative study was carried out in obstetrics and gynaecology department BRIMS tertiary care center between June 2019 to December 2019. This study included 60 antenatal women irrespective of parity and gestational age from 20-40 weeks with hypertensive disorder. Chronic hypertension, diabetes, cardiac, renal disease, hemophilia and bronchial asthma were excluded from the study. The efficacy of labetalol and nifedipine were compared. **Results:** In this study fall in systolic blood pressure (SBP), diastolic blood pressure (DBP) and mean arterial pressure (MAP) in labetalol group was statistically significant when compared to nifedipine. Outcome of fetus was also better with use of oral labetalol. **Conclusion:** The present study indicates labetalol to be better antihypertensive in terms of control of hypertension and fetal outcome.

Keywords: Nifedipine, labetalol, PIH, preeclampsia.

Hypertensive disorder of pregnancy, one of the causes of morbidity and mortality both in mother and fetus.[1] It constitutes the most widely analyzed condition as it badly affects mother and fetus. It complicates about 5-10% of all pregnancies leading to maternal morbidity and mortality.[2]

Hypertensive disorder of pregnancy includes preeclampsia, eclampsia, gestational hypertension, chronic hypertensive and preeclampsia superimposed on chronic hypertensive.[3] Among them preeclampsia and eclampsia are the major causes of maternal and perinatal morbidity and mortality.[1] Pregnancy with hypertension predisposes to complications like antepartum haemorrhage (APH), disseminated intravascular coagulation (DIC), cerebral hemorrhage, hepatic failure, renal failure, HELLP syndrome,[4] intrauterine growth restriction (IUGR) and intrauterine death (IUD). Preeclampsia is defined as a systolic blood pressure (SBP) ≥140mm of Hg or diastolic blood pressure (DBP) ≥ 90mm of Hg on two occasions at least four hours apart after 20 weeks of gestation in women with a previously normal blood pressure (BP).[5]

Selection of antihypertensive agents is the major issue concerned with preeclampsia. Labetalol, nifedipine and methyldopa are preferred choice of drugs. Our study focuses on assessment, safety and efficacy of oral labetalol and oral nifedipine and also the maternal and fetal outcome.

Methods

A prospective comparative study was carried out in obstetrics and gynaecology department BRIMS tertiary care center Bidar between June 2019 to December 2019 after taking ethical committee clearance. The efficacy of labetalol versus nifedipine in management of hypertensive disease of pregnancy was studied. A total of 60 antenatal women with gestational age between 20-40 weeks irrespective parity and diagnosed as pregnancy induced hypertension (PIH) were

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studied.

Inclusion criteria

1) All pregnant women with hypertension whose two blood pressure recordings are ≥ 140/90 mm Hg more than 6 hours apart.
2) Pregnant women with gestational age from 20 weeks of pregnancy till term.
3) Pregnant women who gave consent.

Exclusion criteria

1) Multifetal pregnancy, eclampsia, and women with preexisting or concurrent medical disorders like diabetes mellitus, cardiac diseases, renal disease, thyrotoxicosis, hemophilia and chronic hypertension.
2) Pregnant women with IUD at presentation.
3) Pregnant women those not given consent

A total number of 60 pregnant women with PIH were studied. They were divided into two groups 30 each. Group A received labetalol and group B received nifedipine. Then the effects of labetalol and nifedipine were compared. Labetalol was started at an initial dose of 100 mg twice daily (BD) and the dose was increased as required. Maximum dose of 200 mg thrice daily (TDS) was given. Nifedipine was started with an initial dose of 10 mg BD and the dose was increased up to 20 mg TDS. Patients were monitored daily for blood pressure and fetal well being.

Statistical analysis was done by using unpaired t-test for comparison with p-value (<0.05 P value considered significant).

Results

Table-1, depicts that maximum number of patients in both groups belongs to age group of 21-25 years. Table -2, draws the inference that majority of pregnant women were primigravida about 63.30% in labetalol group and 60% in nifedipine group. Table-3, concludes that maximum patients were in term gestation age 37- 40 weeks in both the groups. Table – 4, shows comparison of mean and standard deviation (SD) of SBP, DBP and MAP between the two groups before treatment and after treatment. Before treatment the SBP, DBP and MAP are not statistically significant but after treatment the SBP, DBP and MAP are extremely significant (p-value < 0.0001) in labetalol group. This shows significant decrease in SBP, DBP and MAP in labetalol group when compared to nifedipine.

The time required to achieve control of blood pressure in group A (labetalol) was 29.8 hours and in B (nifedipine) group was 34.4 hours (p value 0.042) which indicates labetalol group had control of blood pressure earlier than nifedipine group (table 5). Maintenance of control of blood pressure was more effective in labetalol group for 72 hours from the starting dose, than nifedipine group. Group A, labetalol received 100mg BD starting dose and was increased to 200 mg TDS and requirement of additional oral antihypertensive was seen in only 2 women. Whereas group B, nifedipine received 10 mg BD as starting dose and was

Table 1: Age wise distribution of cases

Age in years	Labetalol (Group A)		Nifedipine (Group B)	
	No.	%	No.	%
Up to 20 years	07	23.30	06	20.00
21-25 years	14	46.60	15	50.00
26-30 years	06	20.00	07	23.30
> 30 years	03	10.00	02	6.60
Total	**30**	**100.00**	**30**	**100.00**

Table 2: Case distribution based on parity

Gravidity	Group A; Labetalol		Group B; Nifedipine	
	No.	%	No.	%
1	19	63.30	18	60.00
2	07	23.30	08	26.60
3	04	13.30	04	13.30
Total	**30**	**100.00**	**30**	**100.00**

Table 3: Case distribution based on gestational age.

Gestational Age	Group A; Labetalol		Group B; Nifedipine	
	No.	%	No.	%
20-24 weeks	00	00.00	00	00.00
24-27 weeks	04	13.30	02	6.60
27-30 weeks	05	16.60	04	13.30
31-34 weeks	05	16.60	06	20.00
34-37 weeks	07	23.30	08	26.60
37-40 weeks	09	30.00	10	33.30
Total	**30**	**100.00**	**30**	**100.00**

Table 4: Comparison of mean SBP, DBP and MAP among the two groups

Parameters		Labetalol (Mean, SD)	Nifedipine (Mean, SD)	t-value	df	P-value
SBP	Before treatment	153.2, 5.455	152.2, 6.72	0.6328	58	0.5293 NS
	After treatment	124.2, 4.142	138.4, 4.715	12.392	58	<0.0001 S
DBP	Before treatment	102.4, 5.425	104.8, 6.22	1.592	58	0.1167
	After treatment	90, 3.687	99.8, 1.399	13.6115	58	<0.0001ES
MAP	Before treatment	118.82, 5.457	120.59, 4.323	1.3925	58	0.1691 NS
	After treatment	101.39, 3.451	112.67, 2.300	14.897	58	<0.0001 ES

SBP – Systolic blood pressure; DBP – Diastolic blood pressure; MAP – Mean arterial pressure; NS – Not significant; S – Significant; ES – Extremely significant.

Table 5: Primary outcome (efficacy)

Parameters	Labetalol (N=30)	Nifedipine (N=30)	P - value
Time required to control blood pressure (in hours)	29.8	34.4	0.042
Sustained blood pressure control for 3 days (in %)	52.0	37.0	0.001

Table 6: Secondary outcome (efficacy)

Parameters	Labetalol (N=30)	Nifedipine (N=30)	P - value
Additional oral hypertensive required for control BP	2	3	0.733
Additional intravenous (IV) hypertensive required	6	8	0.79
Hospital stay (in days)	3	4	0.899

increased to 20 mg TDS and requirement of additional antihypertensive drug was noted in 3 women. Group A (labetalol) required additional antihypertensive drug nifedipine to control blood pressure among 2 patients. Group B (nifedipine) required labetalol as an additional antihypertensive to control blood pressure among 3 patients. Intravenous (IV) antihypertensive was given to control acute severe hypertension 1 or 2 doses in 6 patients in labetalol group and 8 patients in nifedipine group. The average hospital stay was around 3 days in labetalol group and 4 days in nifedipine group respectively (table 6).

Table 7: Case distribution based on maternal complications and drug side effects

Complications	Labetalol (Group A)	Nifedipine (Group B)
Severe hypertension	2	3
Eclampsia	-	1
Abruption	-	1
Hypotension	-	2
Palpitation	-	3
Headache	2	4
Flushing	1	1

Table 8: Cases according to fetal outcome

Fetal outcome	Group A; Labetalol No.	%	Group B; Nifedipine No.	%
Preterm	05	16.67	07	23.33
Term	25	83.33	23	76.67
Mean	37.23		36.76	
SD	2.124		2.431	

Table 9: Case distribution according to birth weight.

Fetal outcome birth weight	Group A; Labetalol No.	%	Group B; Nifedipine No.	%
< 2.5kg	04	13.40	06	20.00
≥2.5kg	26	86.60	24	80.00
Mean	2.646		2.586	
SD	0.256		0.2929	

Nifedipine showed maximum complications of severe hypertension, eclampsia and abruption. It was also noted that headache, palpitation and hypotension were seen in nifedipine group (table 7). No statistical difference in comparing fetal outcome in the two groups (p value > 0.4284, t = 0.7974). This show slightly lower incidence of preterm labour in labetalol group (table 8). There was no significance on comparing birth weight (p > 0.4017, t = 0.8448) (table 9).

Discussion

The maximum number of patients in labetalol and nifedipine group belong to 21- 25 years of age and amongst most of them belonged to primigravida, which was in accordance to Shekhar et al (2013)[6] and Hangarga et al (2016).[7] Most of the women were between gestational age of 34-40 weeks, which was found similar to Hangarga et al study. In Labetalol group the fall in mean SBP was 29mm of Hg (153.2 to 124.2) and the fall in mean DBP was 12.9 (102.4 to 90.00) which was statistically significant corresponding to Michael et al study[8] and Stott et al[9]. In nifedipine group the mean fall in SBP was 13.8 mm of Hg (152.2 to 138.4) and DBP is 5 (104.8 to 99.8) which was not that statistically significant. So overall, labetalol group showed better control of BP both SBP and DBP when compare to nifedipine. The commonest side effects were tachycardia, postural hypotension, and occipital headache seen more in nifedipine group. Fetal outcome was better with both the group which was statistically not that significant.

Previous trials conducted on safety and efficacy of labetalol (oral), oral nifedipine, IV labetalol, hydralazine and methyldopa were found to be effective antihypertensive agents[10, 11]. Veena et al[12], Vermillion et al[13], Raheem A et al[10] compare oral nifedipine to IV labetalol in management of hypertension of pregnancy. In our study, labetalol achieved significantly earlier and sustained control blood pressure in comparison to nifedipine, which was in accordance to study conducted by Sharma et al (2017) [14].

Previously studies reported headache palpitation and hypotension as common side effects with use of nifedipine when compare to labetalol and these observations were also noted in our study[13]. The need for an additional antihypertensive was nearly seen in both groups[14]. Nita K Patel et al[15] conducted a prospective study to evaluate the effectiveness and safety of nifedipine, methyldopa and labetalol in PIH and concluded that labetalol was more effective than nifedipine and methyldopa. Our data supports the recent guidelines and expert opinion that labetalol is the suitable first line antihypertensive for hypertensive diseases and emergencies in pregnancy.

Conclusion

We observed in our study that oral labetalol is more efficacious than oral nifedipine. In our prospective study oral labetalol was better in terms of controlling BP and fetal outcome.

Conflict of interest: None. **Disclaimer:** Nil.

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