Original Article

Urgency Or Emergency; Effective Management Of Hypertensive Crisis In Pregnancy

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Abstract

Objective: Hypertension affects approximately 10% of pregnancies worldwide, contributing significantly to maternal morbidity and mortality. Severe hypertension in pregnancy is defined as systolic blood pressure exceeding 160 mmHg and diastolic blood pressure greater than 110 mmHg, persisting for more than 15 minutes. This condition represents an obstetric emergency that necessitates immediate and appropriate management.

Methods: A quasi-experimental study was conducted at a tertiary care centre in Rawalpindi. The study included 70 patients, divided into two groups: Group 1 (n = 35) received oral nifedipine, while Group 2 (n = 35) was treated with intravenous labetalol. Treatment was initiated with 5 mg of oral nifedipine and 20 mg of intravenous labetalol as part of a gradual dose-escalation protocol designed to reduce pharmacological risks while ensuring effective blood pressure control.

Results: The findings revealed that therapeutic blood pressure was achieved significantly faster in the nifedipine group (mean time: 22.3 ± 11.5 minutes) compared to the labetalol group (mean time: 33.5 ± 13.3 minutes, p=0.03). Additionally, fewer doses were required in the nifedipine group than in the labetalol group. The rate of treatment failure was notably higher among patients treated with intravenous labetalol.

Conclusion: Oral nifedipine proved to be as efficacious and safe as intravenous labetalol, with the added advantage of convenience in low-resource settings.

Keywords: Pregnancy-induced hypertension, nifedipine, labetalol, failed treatment, Preeclampsia.

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Introduction

Hypertension during pregnancy is one of the most common medical complications, affecting approximately 10% of pregnancies.[1] It poses significant risks to maternal, fetal, and perinatal health, contributing to increased morbidity and mortality rates.[2] According to the World Health Organisation (WHO), hypertension is associated with 30% of maternal deaths and 22% of all perinatal deaths.[1,3] Furthermore, hypertensive disorders in pregnancy account for nearly 50,000 maternal deaths annually.[3]

The term *hypertension in pregnancy* encompasses a broad spectrum of conditions, ranging from mild hypertension to severe cases with organ failure. The National High Blood Pressure Education Program (NHBPEP) classifies hypertensive disorders in pregnancy into four main categories.[4]

- Chronic hypertension (pre-existing high blood pressure before pregnancy)
- Preeclampsia-eclampsia (new-onset hypertension with end-organ dysfunction)
- Preeclampsia superimposed on chronic hypertension
- Gestational hypertension (also known as pregnancy-induced hypertension)

Per the American College of Obstetricians and Gynaecologists (ACOG) guidelines, a hypertensive emergency in pregnant or postpartum women is defined as a systolic blood pressure (SBP) of ≥160 mmHg and/or a diastolic blood pressure (DBP) of ≥110 mmHg that persists for more than 15 minutes.[5] Elevated blood pressure is a major risk factor for cerebral haemorrhage and, if not promptly and effectively managed, can lead to maternal death. Therefore, rapid yet controlled blood pressure reduction using antihypertensive medications is crucial to prevent severe complications.[6]

The choice of an antihypertensive drug depends on various factors, including the clinician's familiarity with the medication, ease of administration, cost, and potential side effects. Several clinical trials have compared the efficacy and safety of different antihypertensive agents in managing severe hypertension during pregnancy to determine the optimal treatment.[7] Currently, labetalol is considered the first-line therapy, though recent studies have compared its effectiveness with other drugs, such as nifedipine.[8] Emerging evidence suggests that nifedipine may be as effective as labetalol in managing hypertensive crises, offering rapid blood pressure control with fewer doses and minimal side effects.[6, 7]

In low-resource settings, where healthcare facilities are limited and many women seek care at small clinics with insufficient staff and equipment, managing severe hypertension becomes particularly challenging. Often, patients with hypertensive emergencies must be referred to tertiary care centres, delaying critical treatment. Thus, there is an urgent need for an easily administered, safe, and effective antihypertensive drug that requires minimal monitoring and can be used as first-line therapy in such settings.

The objective of our study was to evaluate the efficacy and tolerability of oral nifedipine compared to intravenous labetalol in managing hypertensive crises during pregnancy. The decision to initiate treatment with 5 mg oral nifedipine, rather than the standardised 10–20 mg dose, was based on a stepwise titration strategy aimed at minimising pharmacological risks while maintaining therapeutic efficacy. The goal is to identify a

treatment option that can be safely and efficiently administered in low-resource environments with limited medical personnel, enabling immediate emergency care before patient transfer to higher-level facilities.

Materials And Methods

This quasi-experimental study was conducted at the District Headquarters Hospital in Rawalpindi from January 2023 to December 2023. A total of 70 pregnant participants with severe hypertension (systolic BP ≥160 mmHg and/or diastolic BP ≥110 mmHg) were enrolled and divided equally into two groups using non-probability convenience sampling. The first group (n=35) received oral nifedipine, while the second group (n=35) was administered intravenous labetalol. Inclusion criteria comprised pregnant women aged 18–35 years with a gestational age of 34 weeks or above, confirmed by last menstrual period or ultrasound, along with proteinuria ≥1+ on dipstick testing. Both booked and unbooked cases were included. Exclusion criteria involved patients with prior exposure to the study medications within 24 hours, pre-existing cardiac, hepatic, or renal disease, secondary hypertension, gestational diabetes mellitus, or systemic lupus erythematosus.

Written and oral informed consent was obtained from all participants before enrollment. A comprehensive history, physical examination, and obstetric assessment were conducted, with baseline vitals—including blood pressure (measured via mercury sphygmomanometer, using Korotkoff phase V as the standard), pulse rate, respiratory rate, oxygen saturation, and fetal heart rate—recorded. Urine dipstick analysis and cardiotocography (CTG) were also performed. Blood pressure measurements were taken three times by trained staff to ensure accuracy, and intermittent monitoring continued every 10–15 minutes for the first three hours until BP stabilisation.

The standard initial dose of oral nifedipine for severe preeclampsia typically ranges from 10–20 mg. However, in this study, a conservative 5 mg starting dose was adopted based on pharmacodynamic considerations and a stepwise protocol designed to minimise maternal hypotension and fetal compromise. The nifedipine group received an initial 5 mg oral dose, repeated every 20 minutes up to a maximum cumulative dose of 20 mg.

Due to the unavailability of a commercially manufactured 5 mg nifedipine tablet (cap Nifidil 10 mg manufactured by Zafa Pharmaceuticals), a compounding method was employed. Each 10 mg capsule was carefully opened, and its contents were weighed using a calibrated analytical balance. The powder was divided equally to obtain 5 mg aliquots of the active pharmaceutical ingredient. These were then blended with lactose and compressed into tablet form using a manual tablet press. All compounding procedures were conducted under pharmacist supervision, in accordance with pharmacopeial standards to ensure dose accuracy, uniformity, and patient safety.

The labetalol group received an initial intravenous dose of 20 mg, repeated every 20 minutes, with a maximum cumulative dose of 80 mg. Treatment failure was defined as the inability to achieve the target blood pressure (<140/90 mmHg) after maximum dosing. All patients were closely monitored for adverse effects and blood pressure trends before discharge.

Data were analysed using SPSS version 26. Continuous variables, such as mean BP reduction, time to BP control, number of doses, and side effects, were evaluated using an independent t-test. Categorical variables, including treatment failure and incidence of hypertensive crises, were assessed via chi-square tests, with a p-value <0.05 considered statistically significant. The primary objective was to compare the efficacy of oral nifedipine versus IV labetalol, measured by the number of doses required, time to BP control, and frequency of adverse effects.

This study aimed to determine the optimal antihypertensive therapy for severe pregnancy-related hypertension in low-resource settings, where rapid and safe BP control is critical before patient referral to higher-level care facilities.

Results

The study demonstrated significantly faster blood pressure control with oral nifedipine (28.2 ± 11.7 minutes, mean ± SD) compared to intravenous labetalol (48.4 ± 23.5 minutes, p<0.05) (Table 1). The nifedipine group also required fewer doses (2.3±1.01) than the labetalol group (2.7±1.11, p<0.05) (Table 2). Treatment failure was higher in the labetalol group (11.4%) versus the nifedipine group (5.1%), necessitating crossover therapy in these cases (Table 3). While side effects were generally mild, their incidence was slightly lower in the labetalol group (Figure 1).

Table 1: Time to control blood pressure in minutes

	Nifedipine group N%	Labetalol group N%	Total N %	P value
20	8(22.8)	7(20)	15(21.4)	
40	20(57.1)	16(45)	36(51.4)	
60	3(8.5)	7(20)	10(14.2)	0.02
80	1(2.8)	1(2.8)	2(2.8)	
Mean SD	28.2 (11.7)	48.4 (23.5)		

Table 2: Total number of doses

	Nifedipine group N%	Labetalol group N%	Total N %	P value
1st dose	8(22.8)	6(17.5)	14(20)	
2nd dose	13(37.1)	6(25.7)	22(31.4)	
3rd dose	10(28.5)	13(37.1)	23(32.8)	0.03
4th dose	4(11.4)	7(20)	11(15.7)	
Mean (SD)	2.3(1.01)	2.7(1.11)		

Table 3: Failed treatment

	Nifedipine group N%	Labetalol group N%	Total N %	P value
Failed treatment	3(5.1)	4(11.4)	6(8.4)	0.24

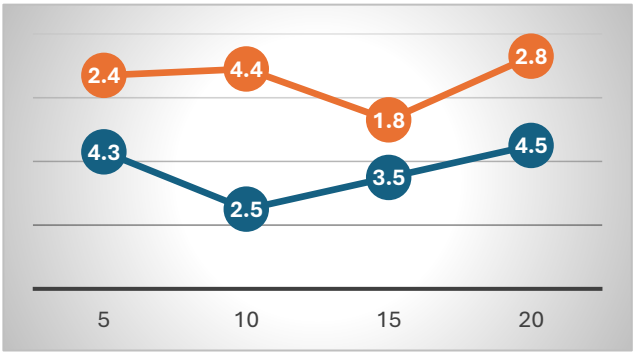

Figure 1: side effects of nifedipine (red) versus labetolol(blue)

Discussion

This study evaluated the efficacy and safety of oral nifedipine as an alternative to intravenous labetalol in the management of severe preeclampsia, particularly in settings where immediate intravenous access may be challenging. Both agents effectively controlled blood pressure, with nifedipine demonstrating faster onset (28.2 ± 11.7 minutes vs 48.4 ± 23.5 minutes, $p < 0.05$), fewer doses required (2.2 ± 0.5 vs 3.2 ± 0.5), and a lower treatment failure rate (5.1% vs 11.4%).

Immediate initiation of antihypertensive therapy is essential for pregnant women diagnosed with severe hypertension in pregnancy to promptly reduce dangerously elevated blood pressure to safe levels. Consequently, agents capable of achieving target blood pressure rapidly and with minimal dosing are considered more advantageous in the management. George et al showed that the mean time and number of doses to achieve target blood pressure are lower in nifedipine when compared to other drugs.[8]

As a calcium channel blocker, nifedipine induces peripheral vasodilation and has been shown to reduce systolic, diastolic, and mean blood pressures by approximately 25%.[9] Our findings corroborate previous studies by Gahlot A,[10] Wu HZ et al,[11] and others,[12-14], though we employed a more conservative dosing regimen (5mg initial dose) to mitigate potential risks of rapid hypotension reported in the literature. Our study employed a conservative 5 mg initial dose of nifedipine, repeated every 20 minutes up to a maximum of 20 mg; in contrast, Shah et al administered 10 mg nifedipine every 30 minutes up to five doses, totalling 50 mg, with a target BP of ≤150/90 mmHg.[15] These higher-dose regimens, while effective, may carry increased risk of maternal hypotension and fetal distress, which might be difficult to treat immediately, especially in unmonitored or peripheral settings.

Side effects were systematically monitored. In the nifedipine group, mild adverse effects occurred in 8.2% of patients, including headache (4.4%), palpitations (2.5%), and transient dizziness (1.3%). These were self-limiting and did not require discontinuation. The labetalol group reported fatigue and nausea in 4.5% of cases. No serious maternal or fetal complications were observed in either group, consistent with the safety profiles reported by Tolcher MC et al, who found no significant difference in adverse outcomes between the two drugs.[16]

Despite these strengths, our study has limitations. It was conducted at a single tertiary care centre, limiting generalizability. The sample size, while adequate for primary outcomes, may not capture rare adverse events. Long-term maternal and neonatal outcomes were not assessed, and biochemical markers of organ dysfunction were not included. Future multicenter trials with extended follow-up and stratified dosing protocols are warranted.

The study population—56.6% primigravidas and 85% unbooked patients- reflects significant gaps in antenatal care. This underscores the need for improved screening and preventive strategies for preeclampsia, especially in resource-limited settings. Given its rapid action, favourable safety, and ease of oral administration, low dosage of nifedipine also emerges as a practical and effective option, particularly in peripheral healthcare facilities where intravenous access may be delayed or unavailable.

Conclusions

Oral nifedipine achieves rapid blood pressure control with fewer doses than intravenous labetalol in severe pregnancy-related hypertension, demonstrating comparable efficacy and safety even at low dosage. Its oral formulation makes it particularly suitable for resource-limited settings where immediate intravenous access may be challenging. These findings support the inclusion of nifedipine as a first-line option in hypertensive emergencies during pregnancy, though further large-scale trials are warranted to reinforce these conclusions. The study highlights the critical need for accessible antihypertensive treatments in underserved areas while emphasising the importance of enhanced antenatal services for early preeclampsia prevention.

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