

Comparison of Hydralazine and Labetalol in Controlling Blood Pressure in Preeclamptic Women Undergoing General Anesthesia

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ABSTRACT

Objective: To compare the time to achieve target blood pressure and change in mean arterial pressure between hydralazine vs. labetalol in preeclamptic women undergoing general anaesthesia.

Methodology: This one year randomized controlled trial was conducted at Department of Anaesthesiology, Farooq Hospital, Rawalpindi. All pregnant women aged between 18-40 years with preeclampsia were selected for the study by non-probability sampling and were randomly divided into two groups. Patients in Group-A received hydralazine while those in Group-B received labetalol for control of blood pressure. Data was collected on prescribed proforma and analyzed by using SPSS version 23.

Results: The mean age of the patients was 26.31±4.69 years while the mean gestational age was 34.21±2.25 weeks. 17.3% patients were nulliparas, 22.7% patients were primiparas while 60.0% patients were multiparas. The baseline mean arterial pressure ranged from 122 mmHg to 135 mmHg with a mean of 128.28±4.26 mmHg. Final mean arterial pressure (MAP) was significantly lower in patients receiving labetalol (98.59±5.91 vs. 104.28±4.40 mmHg; p-value<0.001) as compared to hydralazine.

Conclusion: Labetalol was found superior to hydralazine in terms of more rapid and vigorous control of blood pressure in pregnant women with pre-eclampsia undergoing general anaesthesia.

Key words: Preeclampsia, General Anaesthesia, Labetalol, Hydralazine.

Authors' Contribution:

¹Conception; Literature research; manuscript design and drafting; ²Critical analysis and manuscript review; ³Data analysis; Manuscript Editing.

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Introduction

Preeclampsia is characterized as proteinuria and new-onset hypertension that develops at or after 20 weeks of gestation. It is one of the main global causes of perinatal death¹. It is a major contributor to the morbidity and mortality of both mothers and fetuses. It is dangerous for the world's health in both wealthy and developing nations. However, because the condition manifests later in life, making medical therapies less effective, the impact of the illness is greater in poorer nations².

The currently accepted theory is that inadequate placental perfusion caused by the placenta's failure to embed effectively results in hypoxia. This ultimately results in end-organ damage, microthrombi development, vasospasm, and the activation of the coagulation cascade. The maternal syndrome of preeclampsia, which presents as hypertension and proteinuria with or without systemic symptoms, is caused by the ensuing endothelial damage³. Pre-eclampsia pathophysiology is actually caused by the



placenta, which harms the fetus as well as the mother. Preeclamptic fetal syndrome is characterized by oligohydramnios, aberrant oxygenation, and fetal growth retardation⁴.

When one or more organ systems are involved and hypertension is identified for the first time after the 20th week of pregnancy, preeclampsia is diagnosed. Within three months of giving birth, the organ system's illness processes appear to have resolved⁵. It is further divided into mild and severe categories based on how bad it is⁶. When treating hypertension in pregnancy, the most often utilized criterion is severe hypertension (systolic blood pressure >160 mm Hg or diastolic blood pressure \geq 110 mm Hg)⁷.

Drugs that are considered to be safe for lowering of blood pressure include labetalol and hydralazine⁸. Labetalol is non-selective beta-blocker used in severe hypertension in pregnancy as first line drug but has been associated with neonatal bradycardia, hypotonia, respiratory distress, hypoglycemia, circulatory collapse and feeding problems⁹. Hydralazine is a peripheral vasodilator frequently used in hypertensive crisis in pregnancy with common side effects of shortness of breath, headache, palpitations and sleep disturbances¹⁰.

The purpose of the current study is to repeat this trial and compare these two drugs in terms of mean time to achieve target blood pressure and mean change in mean arterial pressure. The results of the present study will enable selection of more appropriate treatment option in pre eclamptic pregnant women undergoing general anaesthesia in future practice.

Methodology

Anesthesiology, Farooq Hospital, Rawalpindi from January to December 2023. After taking permission from ethical review board of the hospital & written consent, patients were selected by non-probability, consecutive sampling. All the pregnant women between 18-40 years after 20

weeks of gestation, diagnosed of preeclampsia, undergoing general anaesthesia were included in this study. Patients with disturbed liver or renal function tests or diagnosed as eclampsia with fits were excluded from the study. Sample size was calculated using WHO formula with 80% power of test and 95% confidence interval.

A total of 150 Patients were divided equally into two groups. Group A treated with Hydralazine while Group B was treated with Labetalol. Patients randomized to the hydralazine group were administered 5mg of intravenous hydralazine. Patients randomized to the labetalol group were administered 20mg (4ml) of Labetalol. Blood pressure was checked every 5 minutes in both groups. Doses of both medicines were repeated after every 15 minutes if blood pressure was still not controlled till a maximum total dose of respective medicines were administered (total 5 doses) or until target blood pressure was achieved.

Data was recorded on pre designed proforma. All the collected data was entered and analyzed through SPSS version 23. Numerical variables; age, gestational age, time to achieve target blood pressure, MAP at baseline, Final MAP and change in MAP have been presented by mean \pm SD. Independent sample t-test has been applied to compare the mean time to achieve target blood pressure and mean change in MAP between the two groups taking p-value \leq 0.05 as significant.

Results

The age of the patients ranged from 18 years to 35 years. The gestational age of these patients ranged from 30 weeks to 37 weeks. 60.0% patients were multiparas. The baseline mean arterial pressure ranged from 122 mmHg to 135 mmHg.

Both the study groups were comparable in terms of mean of mean arterial pressure (p-value=0.819) at baseline as shown in Table 2.

Table 1. Baseline Characteristics of Study Sample.

Characteristics	Participants n=150
Age (years)	26.31±4.69
18-26 years	77 (51.3%)
27-35 years	73 (48.7%)
Gestational Age (weeks)	34.21±2.25
30-33 weeks	61 (40.7%)
34-37 weeks	89 (59.3%)
Parity	
Nulliparas	26 (17.3%)
Primiparas	34 (22.7%)
Multiparas	90 (60.0%)
Baseline MAP (mmHg)	128.28±4.26

Table 2. Comparison of Various Outcome Measures between the Groups.

Parameter	Hydralazine n=75	Labetalol n=75	P-value
Baseline MAP (mmHg)	128.36±4.37	128.20±4.17	0.819
Final MAP (mmHg)	104.28±4.40	98.59±5.91	<0.001*
Mean Change in MAP (mmHg)	24.08±2.14	29.61±4.37	<0.001*
Time to Achieve Target BP (min.)	28.92±5.06	13.53±3.44	<0.001*

Independent sample t-test, * observed difference was statistically significant

Final mean arterial pressure was significantly lower in patients receiving labetalol (98.59±5.91 vs. 104.28±4.40 mmHg; p-value<0.001) as compared to hydralazine. Labetalol took significantly lesser mean time to achieve target

blood pressure (13.53±3.44 vs. 28.92±5.06 minutes; p-value<0.001) and significantly greater mean change in mean arterial pressure (29.61±4.37 vs. 24.08±2.14 mmHg; p-value<0.001) as shown in Table 2.

Discussion

The mean age of pre-eclamptic women in this study was 26.31±4.69 years. The mean age of pre-eclamptic patients has not been the subject of many prior investigations. Khan et al. in Karachi reported a mean age that was similar, 26.87±5.22 years.¹¹, Naseeb et al. (26.94±5.5 years) and Shoaib et al. (26.06±5.01 years)^{12,13}. Among pre-eclamptic women presenting at Lahore General Hospital, Lahore, and Civil Hospital, Karachi, Tariq et al.¹⁴ and Hossain et al.¹⁵ reported comparatively higher mean ages of 27.99±5.11 years and 27±5.37 years, respectively, while Aziz et al. reported comparatively lower mean ages of 25 (24.65±4) years among pre-eclamptic pregnant women presenting at Holy Family Hospital, Karachi¹⁶. Comparable mean age of 25.42±5.21 years was reported by Nabanita et al also¹⁷.

We found that preeclamptic women had a mean gestational age of 34.21±2.25 weeks. Previous studies by Naseeb et al. (2015)¹³ and Khan et al. (2017, 33.10±2.60 weeks) have reported a mean gestational age that is similar. Pre-eclamptic women had a relatively greater mean gestational age (36.9±0.9 weeks) in India¹⁸ and Pakistan¹⁵

Table 3. Stratification of Mean Change in Mean Arterial Pressure (mmHg) between the Groups.

Subgroups	Mean Change in MAP (mmHg)		P-value
	Hydralazine n=75	Labetalol n=75	
Age (years)			
18-26 years	23.78±1.96	29.45±4.24	<0.001*
27-35 years	24.37±2.28	29.80±4.56	<0.001*
Gestational Age (weeks)			
30-33 weeks	23.77±1.71	28.83±4.13	<0.001*
34-37 weeks	24.30±2.39	30.13±4.49	<0.001*
Parity			
Nulliparas	24.31±1.32	29.85±4.02	<0.001*
Primiparas	23.28±1.74	29.44±5.10	<0.001*
Multiparas	24.34±2.41	29.61±4.29	<0.001*

Independent sample t-test, * observed difference was statistically significant

according to Hossain et al. and Kanagal et al. Conversely, Shoaib & colleagues¹² (33.28±4.24 weeks) and Aziz et al.¹⁶ (32.31±1.19 weeks) noted that the mean gestational age of these women was significantly lower.

We observed that the final mean arterial pressure was significantly lower in patients receiving labetalol (98.59±5.91 vs. 104.28±4.40 mmHg; p-value<0.001) as compared to hydralazine. Labetalol was found superior to hydralazine in terms of significantly lesser mean time to achieve target blood pressure (13.53±3.44 vs. 28.92±5.06 minutes; p-value<0.001) and significantly greater mean change in mean arterial pressure (29.61±4.37 vs. 24.08±2.14 mmHg; p-value<0.001). Khan et al.¹¹ in a similar study at Civil Hospital Karachi reported that labetalol was superior to hydralazine in terms of significantly lower final mean arterial pressure (107.10±7.19 vs. 109.54±7.00; p-value<0.05) and significantly higher mean change in mean arterial pressure (29.10±7.21 vs. 25.05±10.15 mmHg; p-value=0.046) in women presenting with hypertensive pregnancy. Our results are also in line with those of Patel et al. from India who reported similar significantly shorter mean time to achieve target blood pressure (12.63±7.19 vs. 26.32±9.78 minutes; p-value<0.0001) with labetalol in Indian women with pregnancy induced hypertension¹⁹.

Donel et al. did double-blind randomized clinical trial from May 2021 to April 2022 in Indonesia. According to this study, Labetalol is more effective in reducing blood pressure after single dose as compare to hydralazine but after three doses, hydralazine seems to be more effective than labetalol in controlling blood pressure²⁰. Mauzma Kausar et al. did comparative study on labetalol and hydralazine at the Department of Obstetrics and Gynecology, Ziauddin University Hospital, Karachi from 1st June 2019 to 30th June 2020 on 208 patients having severe pre-eclampsia (systolic pressure ≥160 mmHg. Labetalol seem to be more effective in reducing blood pressure in

preeclamptic women²¹. Patel et al. reported that labetalol was superior to hydralazine in terms of significantly shorter mean time to achieve target blood pressure (12.63±7.19 vs. 26.32±9.78 minutes; p-value<0.0001) in Indian women with pregnancy induced hypertension¹⁹. Khan et al. in 2017 in a local study reported that labetalol was superior to hydralazine in terms of significantly higher mean change in mean arterial pressure (29.10±7.21 vs. 25.05±10.15 mmHg; p-value=0.046) in women presenting with hypertensive pregnancy at Civil Hospital Karachi¹¹.

Limitation & delimitation: A very important limitation of the presents study was that we did not compare the fetomaternal side effects of these two drugs which are also equally important and should be investigated. Such a study is highly recommended in future research.

Conclusion

Labetalol found superior to hydralazine in terms of more rapid and vigorous control of blood pressure in pregnant women with pre-eclampsia undergoing general anesthesia which is desirable in high-risk obstetric anesthesia and therefore advocates preferred use of labetalol among such cases in future practice.

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