



## STUDY OF HYDRALAZINE IN CONTROLLING BLOOD PRESSURE IN PREGNANCY INDUCED HYPERTENSION

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**ABSTRACT** **Background:** Hypertensive disorders of pregnancy (HDP) are one of the most common medical complications of pregnancy. Hydralazine has been used for almost 40 years in the management of preeclampsia and is the prototype of peripherally acting anti-hypertensive drug.

**Objectives:** 1. To assess the efficacy of intravenous hydralazine in pregnancy induced hypertension. 2. To assess the time taken and the number of doses required to achieve a target blood pressure of <140/90 mmHg.

**Methodology:** It is an interventional study conducted in the department of Obstetrics & Gynaecology, VIMSAR, Burla from December 2015 to June 2017. 100 cases admitted to the labour room or OPD were randomly selected and enrolled after fulfilling inclusion and exclusion criteria. These 100 cases received intravenous hydralazine.

**Results:** Most of the patients were in the age group 21-25 years (44%) followed by 26-30 years (35%). Intravenous hydralazine was found to be effective in controlling blood pressure in pregnancy induced hypertension which was found to be significant with p-value <0.05. Mean number of doses required to achieve the target BP was 1.96 and the time required for it was 29.51 minutes. **Conclusions:** Based on all the observations and analysis it was seen that intravenous hydralazine is effective in controlling blood pressure in pregnancy induced hypertension and no significant side-effects were observed for the drug.

**KEYWORDS :** Hydralazine, Pre-eclampsia, Eclampsia, Pregnancy Induced Hypertension.

**INTRODUCTION:** Hypertensive disorders of pregnancy (HDP) are one of the most common medical complications of pregnancy. According to multiple reports, HDP affect 10–15% of all pregnancies which being a major cause of maternal, fetal and neonatal morbidity and mortality (1),(2). Hypertensive disorders of pregnancy classified as : 1) gestational hypertension 2) preeclampsia-eclampsia 3) chronic hypertension: a)essential, b)secondary 4) pre-eclampsia superimposed on chronic hypertension. (3)

Although it is widely accepted that PIH is unique to pregnancy and regresses after delivery, a large proportion of eclampsia patients have their first seizure during the puerperium. (4),(5)

The first principle of treatment of hypertension in pregnancy is to correctly diagnose the category and severity of the hypertension. The second and perhaps even more important principle is to understand the potential vulnerability of the fetus to treatment (6). Intravenous labetalol and hydralazine have long been considered the first line medications for the management of acute onset severe hypertension in pregnant women and women in the post partum period. Hydralazine is safe and has been used extensively in pregnancy (3),(7). It is a direct vasodilator of arterioles that lowers mean arterial pressure and increases cardiac output and heart rate without affecting pulmonary capillary wedge pressure.(8). The main obstetric use of hydralazine is to rapidly lower blood pressure, via intravenous injection, in patients with severe preeclampsia and hypertensive crisis (9).

### The present study aims:

1. To assess the efficacy of intravenous hydralazine in pregnancy induced hypertension.
2. To assess the time taken and the number of doses required to achieve a target blood pressure of <140/90 mmHg

### MATERIALS & METHODOLOGY:

It was an interventional study conducted among 100 Pregnant women with blood pressure >160/110 mmHg, who were admitted to the labour room or outdoor of VIMSAR, Burla. The study was conducted from December 2015 to June 2017.

### Inclusion criteria: includes

- Age 18 to 35 years,
- All pregnant women of 20 weeks gestation or more
- Singleton pregnancy
- Preeclampsia: systolic blood pressure >160mmHg; diastolic blood

pressure >110mmHg,

- Proteinuria 1+
- Imminent eclampsia :pre-eclampsia with symptoms like- visual disturbances, scotoma or blurred vision, epigastric or upper quadrant pain caused by stretching of glisson's capsule, headache, reeling of head, vomiting.
- Eclampsia: occurrence of convulsions in women whose condition also meet the criteria for pre-eclampsia

### Exclusion criteria:

- Essential hypertension.
- Cardiac disease
- Bronchial asthma
- Hematological disorders
- Allergy to Hydralazine
- Diabetes
- Liver disorders
- Maternal heart rate <60 or >120 beats per minute

**Study instrument:** After taking Informed written consent from each study subjects; Enrolled patients were randomised to receive intravenous hydralazine.

**Procedure :** In our study we used injection hydralazine vial which contained one ml of solution containing 20 mg of hydralazine. So it was first diluted with 9 ml NS to make it into 10 ml. Each time 2.5 ml of solution was injected intravenously slowly which contained 5 mg of hydralazine and was repeated in the same 2.5 ml dose if required.

During the study period maternal blood pressure recorded at every 15 minutes interval till first 30 minutes after achieving target blood pressure i.e. <140/90, then every 30 minutes for next 2 hours, then every hourly.

Continuous maternal vital parameters and fetal heart rate monitoring was done.

- Treatment was considered as **failure:** If blood pressure doesn't decrease even after increasing the dose to maximum. Additional antihypertensive agent was added and was managed accordingly.
- Treatment was considered as **successful:** If blood pressure decreases after administration of intravenous hydralazine
- Data analysis: All the data obtained from the study had been put into an excel sheet. These data were analysed by using frequency,

Chi Square Test, Student Paired T-Test. P-value obtained and its significance level was checked. If P-Value is <0.05 it is said to be significant.

**RESULTS :**

**TABLE-1: Efficacy of Iv Hydralazine in different age groups (N=100)**

Age group (years)	Successful No(%)	Failure No(%)	Total (n=100)	P-VALUE
≤20	19 (100%)	0 (0%)	19	
21-25	41 (93.2%)	3 (6.8%)	44	0.44
26-30	31 (88.6%)	4 (11.4%)	35	
>30	2 (100%)	0 (0%)	2	

**Table 2: Efficacy of intravenous Hydralazine in respect to severity of PIH (N=100)**

Severity of PIH	Successful No (%)	Failure No (%)	Total	P-value
GHTN	5 (83.33)	1 (6.67)	6	
PREECLAMPSIA	66 (94.28)	4 (5.72)	70	0.575645
ECLAMPSIA	22 (91.66)	2 (8.34)	24	

Table 2 shows no differences in outcomes of IV Hydralazine administration among the study groups in respect to the severity of PIH.

**Table 3: Mean no of dose required to achieve target BP(N=100)**

No of doses	No of cases (n=100)	MEAN
1	54	1.96
2	20	
3	2	
4	6	
5	7	
6	4	

Table 3 represent Mean number of doses required to achieve the target BP was 1.96

**Table 4: Mean time required to achieve target BP(N=100)**

TIME REQUIRED IN MINUTES TO ACHIEVE TARGET BP	NO OF CASES (100)	MEAN
15	54	
30	20	
45	2	
60	6	29.51
75	7	
90	4	

Table 4 represent Mean time required for achieving BP was 29.51 minutes

**Table 5: Efficacy of intravenous hydralazine in controlling BP in study population (N=100)**

Variables	Pre-inter Ventional blood pressure (mmHg) (mean)	Post-inter Ventional blood pressure (mmHg) (mean)	Difference (mmHg) (mean)	p-value	Confidenc e interval
SBP	177.63	132.64	44.99	<0.0001	42.04-47.94
DBP	119.18	82.06	37.12	<0.0001	35.81-38.42
MAP	138.65	98.92	39.73	<0.0001	38.08-41.38

Table 5 represents a decrease in mean arterial pressure of 39.73 mm of Hg. Study participants also show significant lowering of SBP,DBP & MAP after IV Hydralazine administration as P-Value is <0.005

**Figure 1: Side-effects of intravenous Hydralazine in the study population (N=100)**

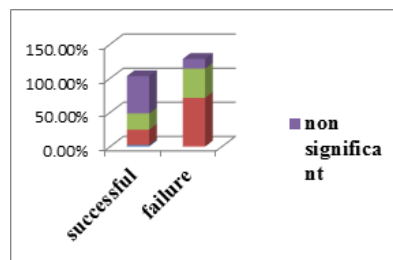


Figure 1 demonstrates that Study participants labelled as successful are having greater proportion of cases (54.83%) without having any side-effect than those who were labelled as failure(14.28%) and this is statistically significant as p is 0.041.

**DISCUSSION :**

Hydralazine has been used for almost 40 years in the management of preeclampsia and is the prototype of peripherally acting anti-hypertensive drug. It is a vasodilator that acts directly on the smooth muscle fibers of the arterial circulation. It has no effect on post-capillary capacitance vessels.

This study shows that IV Hydralazine administration becomes successful most in the age group ≤20 yrs (100%) followed by the age group 21-25 yrs (93.18%) and 26-30 yrs (88.57) but it is not statistically significant as p is 0.44. The decrease in response of the drug with advancing age may be due to impairment in the function of many regulatory processes (such as liver, kidney) that provide functional integration between cells and organs. Whereas in a study conducted by Trivedi S etal (10) found most cases belong to the age group of 21-25yrs.

This study shows that IV Hydralazine administration becomes successful most in patients presented with complications of pre-eclampsia (94.28%) followed by eclampsia (91.66%) and GHTN (83.33%) as stated by Kuzniar J et al (11).

Thirty minutes after intravenous administration of 12.5 mg hydralazine, a significant decrease in mean arterial pressure (21%) occur in pre-eclampsia group. The hemodynamic response in chronic hypertension with super imposed pre-eclampsia group was attenuated; the mean arterial pressure fell by an average of 11%. (11) Increased response in pre-eclampsia may be explained by lesser degree of involvement of vital organs and enzymes which are needed for the optimal effect of the drug as compared to eclampsia.

In this study we can observe that mean number of doses required to achieve target BP i.e. <140/90 is 1.96 with SD 1.491565 & SE 0.155506. Study done by Rezaei Z et al found that hydralazine group needed 1-5 (2.1±1) doses to achieve the goal blood pressure (12).

In this study we can observe that mean time required to achieve target BP i.e. <140/90 is 29.51 minutes with SD 22.373474 & SE 2.332596. Rezaei Z et al (12) found that patients prescribed by intravenous hydralazine achieved the desired blood pressure in 34.8±18.8 minutes for (P≤0.016). Hennessy A et al found reduction in systolic and diastolic blood pressure in 34 minutes for hydralazine (13). Dimich I et al found that Hydralazine produced significant reductions in arterial blood pressure within 10 minutes, which lasted at least 2 hours. (14).

This study shows significant reduction in SBP and the p-value is <0.0001 which is statistically extremely significant similarly to the study done by Baggio MR et al where significant reduction in systolic blood pressure was observed. (15)

This study shows significant lowering of DBP after Hydralazine administration with a p-value <0.0001 which is statistically extremely significant similar to the study done by Baggio MR et al where a significant reduction in diastolic blood pressure was observed (15) and Rosenfeld J et al where satisfactory blood pressure control (diastolic pressure less than 90 mmHg) was achieved in 86% of patients receiving hydralazine. (16)

This study shows significant lowering in MAP after IV Hydralazine administration with p-value <0.0001 which is statistically extremely significant supported by the study done by Cotton DB et al where the acute effects of intravenous hydralazine was found to cause a decrease in mean arterial pressure. (17)

This study shows pre-treatment MAP to be 138.65 mmHg and post-treatment MAP to be 98.92 mmHg with a decrease in MAP of 39.73 mmHg with CI of 38.08-41.38. Previously Trivedi S et al reported that pre-treatment mean arterial blood pressure was 126.61±6.475 mmHg and post-treatment mean arterial blood pressure was 109.27±14.30 mmHg in Hydralazine group. (10) Our finding collaborate earlier studies including Cochrane review on the efficacy of either drugs in hypertensive crisis in pregnancy. (18),(19),(20)

This study shows that the side-effects occurring in cases labelled as successful most are associated with fetal distress (52.58%) followed by maternal tachycardia (50%) & maternal hypotension (4.76%). The side-effects occurring in cases labelled as failure, most are associated with maternal tachycardia (83.33%) followed by fetal distress (50%).

### CONCLUSION :

This study on intravenous hydralazine in the treatment of pregnancy induced hypertension concluded that this drug is effective in controlling severe hypertension without having major maternal and perinatal morbidity and mortality. Hydralazine is well tolerated and has rapid onset of action for controlling severe hypertension. It can safely be used as a first line anti-hypertensive in severe pregnancy induced hypertension.

**LIMITATION & RECOMMENDATIONS :** This study was a small study by taking 100 patients. Large multicentric trials are required to highlight the variables with greater statistical significance.

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