



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 8, Issue, 10, pp. 20637-20639, October, 2017

**International Journal of
Recent Scientific
Research**

DOI: 10.24327/IJRSR

Research Article

A STUDY ON EFFICACY OF INTRAVENOUS HYDRALAZINE IN HYPERTENSIVE URGENCY AMONG DIFFERENT AGE GROUPS IN EMERGENCY ROOM

Nandu Mohan*, Gireesh Kumar K.P and Sreekrishnan T.P

Department of Emergency Medicine, Amrita Institute of Medical Sciences,
Amrita University, Kochi, India

DOI: <http://dx.doi.org/10.24327/ijrsr.2017.0810.0931>

ARTICLE INFO

Article History:

Received 05th July, 2017

Received in revised form 08th

August, 2017

Accepted 10th September, 2017

Published online 28st October, 2017

Key Words:

Hypertensive urgency, Blood Pressure,
Hydralazine, Efficacy, Age

ABSTRACT

Hypertensive urgency poses a serious risk if not treated effectively. This study was conducted to assess the efficacy on intravenous hydralazine among patients with hypertensive urgency presenting to the Emergency room. A prospective observational study was conducted from October 2016 to March 2017, in the Emergency room of a tertiary care teaching hospital, among patients with hypertensive urgency i.e. BP greater than 180/120 mm Hg without target end-organ damage. Intravenous hydralazine 10mg, which is standard treatment protocol was administered. The BP were recorded after 30 and 60 minutes. Efficacy was measured in percentage reduction of systolic BP in one hour. Frequency, percentage, mean, standard deviation and inter-quartile range were used to summarize descriptive statistics. Paired t test and Student's t test were applied to test significance of differences. Total 79 patients with mean age of 58.53±14.543 years. Mean change in systolic blood pressure after 1 hour is 39.57±17.65 mm Hg (p value <0.001). The mean percent change in SBP is 19.55±7.77 %. Second dose requirement for only 19(24.1%) patient. Also noticed that the mean SBP change among <60 yrs of age group was 34.73±14.67 mm Hg and that among >60 yrs was 44.79±3.12 mm Hg. No adverse reactions were noted in the patients. The study reports that intravenous hydralazine is a safe and effective treatment for hypertensive urgency patients, also tendered to be more effective among geriatric age groups compared to other age groups in an emergency room setting.

Copyright © Nandu Mohan., Gireesh Kumar K.P and Sreekrishnan T.P, 2017, this is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Hypertensive crisis is defined as a rapid, inappropriate, symptomatic elevation in blood pressure, which is a common clinical occurrence that accounts for as many as 3% of all emergency department visits.^[1,2] The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) divides hypertensive crisis into two categories: hypertensive emergency and hypertensive urgency.^[3] Hypertensive emergency is characterized by a severe elevation in BP in conjunction with end-organ damage.^[4] On the other hand, hypertensive urgencies are situations where the patient's elevated blood pressure ultimately poses a serious risk if it is not treated aggressively.^[5,6] Hypertensive emergencies such as hypertension with acute heart failure and pulmonary edema also require initial blood pressure control with appropriate therapy and intensive care monitoring.

Hydralazine is a direct vasodilator of arterioles & for years has been a useful drug in the treatment of hypertensive crisis, particularly eclampsia of pregnancy. In this study the efficacy of intravenous hydralazine was assessed, along with requirement of second dose of hydralazine among patients with hypertensive urgency presenting to the emergency room. Also, the effect of labetalol was compared between those aged above and below 60 years.

MATERIALS AND METHODS

Study design and setting: A prospective observational study was done in the Emergency department of Amrita Institute of Medical Science (AIMS), a tertiary care teaching hospital located in Kochi city in Southern India.

Study population: All patients presenting to the ER and diagnosed with 'hypertensive urgency' between the study period of October 2016 to March 2017 were included in the study. 'Hypertensive urgency' as per JNC 7 is defined as blood pressure greater than 180/120 mm Hg without target organ

*Corresponding author: **Nandu Mohan**

Department of Emergency Medicine, Amrita Institute of Medical Sciences, Amrita University, Kochi, India

damage.^[7] Pregnant women and patients who were less than 18 years of age were excluded from the study. Patients included in the study were given an intravenous bolus of hydralazine 10mg after ensuring that there was no contraindication for the same, which includes hypersensitivity to hydralazine or any component of the formulation, coronary artery disease, mitral valve rheumatic heart disease. Intravenous hydralazine is the standard treatment protocol adopted in the Institute. Ethical committee of Amrita Institute of medical science granted permission for conducting the study.

Study variables: Initial recordings of Blood pressure (BP), heart rate and oxygen saturation were noted. A baseline ECG was also taken. Therapeutic target was to reduce the systolic blood pressure to utmost 25% of the initial recording within the first 24hrs. Repeat measurements of blood pressure were recorded 30 and 60minutes after the administration of the drug. Efficacy was measured as percent reduction in systolic blood pressure, along with requirement of second dose of hydralazine. Adverse effects of hydralazine such as Angina pectoris, circulatory shock, flushing, orthostatic hypotension, palpitations, tachycardia were also checked.

Statistical analysis: Data was entered in MS Excel and analyzed using IBM Statistical Package for Social Sciences version 20. Descriptive statistics were summarized as frequency, percentages, mean and standard deviation. Paired-t test was used to test the significance of difference and Student's t test was applied to test significance of differences between those aged above and below 60 years. P value of less than 0.05 was considered to be statistically significant.

RESULTS AND DISCUSSION

A total of 79 patients were included in the study. Mean age was 58.53±14.543 years. Mean initial systolic blood pressure was 199.85±16.05 mm Hg, mean initial diastolic blood pressure was 127.34±7.58 mm Hg and mean initial mean arterial pressure was 151.51±7.40 mm Hg. The oxygen saturation and baseline ECG were normal for all patients. After one hour administration of hydralazine, the mean change in SBP is 39.57±17.65 mm Hg, mean change in DBP is 25.54±11.95 mm Hg and mean change in MAP is 30.22±11.59 mm Hg.

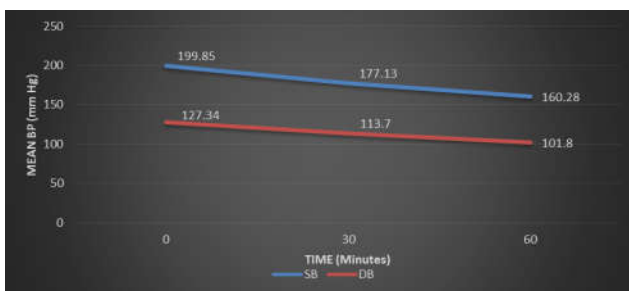


Figure 1 Time dependent response to hydralazine

Table 1 Effect of hydralazine on Systolic blood pressure

Percentage reduction in SBP	Frequency(n)	Percent(n%)
0-15	19	24.1
15-25	60	75.9

Time dependent mean systolic blood pressure response to labetalol is represented in figure 1. The mean reduction in

Systolic BP one hour after administration of hydralazine is 39.57±17.65 mm Hg (p value <0.001) which gives a mean percent reduction of 19.55±7.77%, as explained in table 1. Hydralazine showed a significant reduction in both systolic, diastolic and MAP. Distribution of patients by percentage reduction in systolic blood pressure is furnished in table 1. It was also pertinent to note that none of the patients reported any adverse effect from hydralazine.

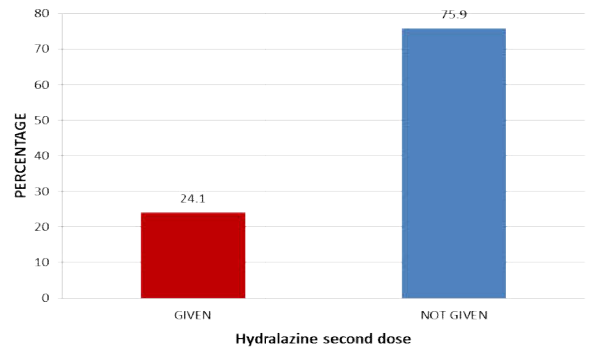


Figure 2 Requirement of second dose of hydralazine

Second dose requirement was based on patients blood pressure reduction within 24 hrs after administration of hydralazine, which was only for 19(24.1%) patients (Figure 2). So second dose requirement was minimal for the study group.

For subgroup analysis, patients were divided into two groups as elderly i.e. aged above 60 years and those below 60 years is furnished below.

Table 2 Age Group Analysis

	AGE2GRP	N	Mean	Std. Deviation	Std. Error Mean
SBPchange	<60	41	34.7317	14.67485	2.29183
	>60	38	44.7895	19.24263	3.12157
SBPpercent	<60	41	17.5201	7.00094	1.09336
	>60	38	21.7467	8.04370	1.30486
DBPchange	<60	41	25.6585	12.96073	2.02413
	>60	38	25.4211	10.92389	1.77209
MAPchange	<60	41	28.6829	12.21974	1.90840
	>60	38	31.8772	10.77519	1.74797

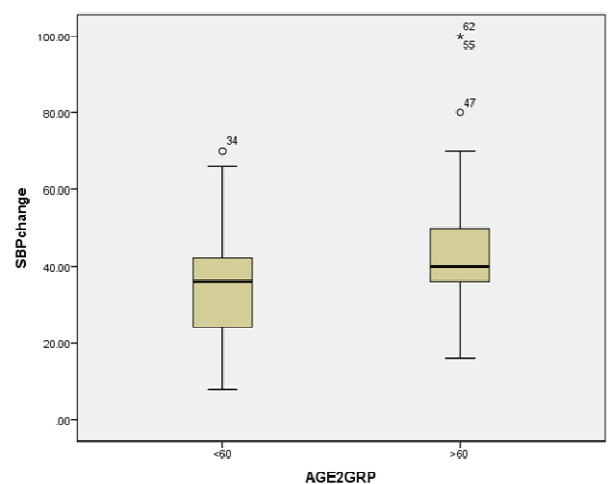


Figure 3 Comparing the effect of hydralazine among those aged above and below 60 years

The age group comparison revealed that mean SBP change among <60 yrs was 34.73±14.67 mm Hg and that among >60 yrs was 44.79±3.12 mm Hg. A significant difference in reduction in systolic blood pressure was noted among those

aged <60 and those aged >60 years. The significance level was less than 0.05

Hydralazine is a direct vasodilator of arterioles (with little effect on veins) with decreased systemic resistance. Intravenous/intramuscular dosage of hydralazine is 10 to 20mg every 4 to 6 hrs as needed.^[16,17] There are no head to head comparison studies on different age group, to compare the efficacy of hydralazine in hypertensive urgency in the existing literature. Hence it is a pilot study. The present study showed that the mean percent reduction in systolic BP one hour after administration of intravenous hydralazine was 19.55±7.77%. Goal is to reduce the blood pressure by no more than 25% (within 24hrs) as excessive reduction in blood pressure can precipitate coronary, cerebral, or renal ischemia and possibly infarction.^[8] Also there was significant difference in the effect of labetalol among the elderly compared to others.

A study conducted at Haukeland hospital in Norway, revealed that intravenous bolus injection of labetalol induced an immediate fall in blood pressure by around 22.4% in patients with severe hypertension.^[9] Another study conducted by Goa et al showed that labetalol administered intravenously, as repeated bolus injections or slow intravenous infusion, rapidly lowered blood pressure within 5 to 30 minutes in 70% to 95% of patients. In the same study labetalol was also shown to be more effective than propranolol in Black patients, and lowered heart rate to a lesser extent than β -blocker. Elderly patients also responded well to labetalol.^[10] In our study hydralazine caused significant reduction in both systolic and diastolic BP.

There are multiple options for the treatment of hypertensive urgency in emergency setting. Oral drugs that can be used in hypertensive urgency includes Nifedipine, Captopril, Clonidine, Furosemide, Prazosin, Nicardipine, and Lacidipine; Parenteral drugs include Labetalol, Hydralazine, Enalaprilat, Urapidil, Fenoldopam, Diazoxide and Nitroprusside.^[11] Most of these drugs used in hypertensive urgency are hampered with serious side effects. Nitroprusside is a powerful vasodilator that requires constant surveillance as it can lead to a sudden drop in blood pressure.^[11] Diazoxide, another parenteral anti-pressor agent also induces very rapid fall in blood pressure, but in addition can cause reflex tachycardia, cerebral vascular accidents and myocardial infarction owing to unwanted hypotension.^[12-14] Reflex tachycardia is a frequent problem encountered during the use of hydralazine.^[15]

CONCLUSION

The study shows that hydralazine is a safe and effective antihypertensive agent in hypertensive urgency in an emergency room setting due to the reasons such as: 1) Prompt BP reduction in hypertensive urgency, 2) No adverse consequences to acute therapy, 3) Acute medication loading results in improved short-term BP control and 4) Minimal second dose requirement. It is also pertinent to note that hydralazine was more effective among geriatric age group.

References

1. Burt VL, Whelton P, Roccella EJ, Brown C, Cutler JA, Higgins M, Horan MJ, Labarthe D. Prevalence of hypertension in the US adult population results from the Third National Health and Nutrition Examination Survey 1988-1991, *Hypertension*, 25, 1995, 305-313.
2. Zampaglione B, Pascale C, Marchisio M, Cavallo-Perin P. Hypertensive urgencies and emergencies prevalence and clinical presentation, *Hypertension*, 27, 1996, 144-147.
3. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo Jr JL, Jones DW, Materson BJ, Oparil S, Wright Jr JT, Roccella EJ, The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure: the JNC 7 report, *Jama*, 289, 2003, 2560-2571.
4. Houston M, Hypertensive emergencies and urgencies: pathophysiology and clinical aspects, *American Heart Journal*, 111, 1986, 205-210.
5. Martin JF, Higashiyama É, Garcia E, Luizon MR, Cipullo JP, Hypertensive crisis profile: prevalence and clinical presentation, *Arquivos Brasileiros de Cardiologia*, 83, 2004, 125-130.
6. Calhoun DA, Oparil S, Treatment of hypertensive crisis, *New England Journal of Medicine*, 323, 1990, 1177-1183.
7. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, et al, The Seventh Report Of The Joint National Committee On Prevention, Detection, Evaluation, And Treatment Of High Blood Pressure, The JNC 7 Report, *Evidence Based Ophthalmology*, 4, 2003, 179-180.
8. Brewster LM, Michael Sutters, Hypertensive Urgencies & Emergencies-Hypertension Drug Therapy, Systemic Hypertension. Available from: <www.health.am/hypertension/hypertensive-urgencies-emergencies/> [Accessed on: 1-1-2017]
9. Omvik P, Lund-Johansen P, Acute hemodynamic effects of labetalol in severe hypertension, *Journal of Cardiovascular Pharmacology*, 4, 1982, 915-920.
10. Goa KL, Benfield P, Sorkin EM, Labetalol, *Drugs*, 37, 1989, 583-627.
11. Gifford RW, Management and treatment of malignant hypertension and hypertensive emergencies, *Hypertension: Pathophysiology and Treatment*, 1977, 1024-1038
12. Finnerty Fa, Kakaviatos N, Tuckman J, Magill J, Clinical Evaluation of Diazoxide A New Treatment for Acute Hypertension, *Circulation*, 28, 1963, 203-208.
13. Kumar GK, Dastoor FC, Robayo JR, Razzaque MA, Side effects of diazoxide, *JAMA*, 235, 1976, 275-276.
14. O'Brien KP, Grigor RR, Taylor PM, Intravenous diazoxide in treatment of hypertension associated with recent myocardial infarction, *British Medical Journal*, 4, 1975, 74-77.
15. Moyer JH, Hydrallazine (apresoline®) hydrochloride: pharmacological observations and clinical results in the therapy of hypertension, *AMA Archives of Internal Medicine*, 91, 1953, 419-439.
16. Marik PE and Varon J. Hypertensive crises: challenges and management. *Chest*. 2007; 131(6); 1949-1962. [PubMed 17565029].
17. Rhoney D, Peacock WF. Intravenous therapy for hypertensive emergencies, part 1. *Am J Health Syst Pharm*. 2009; 66(15):1343-1352. [PubMed 19635770].