

# The Role of a Single Dose of Sublingual Nifedipine in Managing Hypertensive Emergencies in the Patients who Undergo Haemodialysis

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## ABSTRACT

**Introduction:** The hypertensive emergencies in haemodialysis require immediate therapy, usually by parenteral drug administration; however, sublingual medications may have a potential in this special condition.

**Methods:** A prospective, non randomized, case control study was carried out to know the effectiveness and the safety of a single dose of 5mg Nifedipine (sublingual) in this subset of patients. About 100 patients were studied, who were on maintained haemodialysis and were having high Blood Pressure (BP) during the haemodialysis. The patients were monitored for about 5 hours.

**Results:** The patients who had chronic renal failure, who were maintained on regular haemodialysis, who had high systolic and diastolic blood pressure of >220 (systolic) and >125 (diastolic) respectively, were subjected to the study. These patients were

of the 20-70 years age group, who visited our hospital between January 2010 to January 2011. Out of the 100 patients 30% were females and the rest (70%) were males. A single dose of nifedipine (5 mg by the sublingual route) was prescribed to determine its effectiveness and safety in the treatment of hypertensive emergencies during haemodialysis.

The side effects of the drug were closely monitored. The blood pressure and the heart rate were measured continuously up to 280 min post-dose. The response rates were 90 % for nifedipine. The significant hypotensive effects of sublingual nifedipine occurred at 10 min, and a maximum reduction occurred after 30 mins and it continued up to 120 min.

**Conclusions:** We concluded that sublingual nifedipine was effective and that it seemed to have less side effects. It may be an excellent drug in the urgent treatment of hypertensive emergencies in haemodialysis.

**Key Words:** Nifedipine, Haemodialysis

## INTRODUCTION

Uncontrolled hypertension can progress to a hypertensive crisis which is defined as a systolic blood pressure of >180 mm Hg or a diastolic blood pressure of >120 mm Hg. A hypertensive crisis can be further classified as a hypertensive urgency or a hypertensive emergency, depending on an end-organ involvement which includes cardiac, renal, and neurologic injuries [1]. The seriousness of the emergency, the rapidity with which the BP should be lowered and the selection of the drug, are the keys. The prevalence of hypertension in the patients who are on dialysis is as high as 90% [2]. The hypertensive emergencies in haemodialysis require an immediate therapy, usually by parenteral drug administration; however, the sublingual medications may have a potential in this special condition.

Nifedipine is a dihydropyridine calcium antagonist. An L-type calcium channel blocker, nifedipine, increases the DMT-1-mediated cellular iron transport 10- to 100-fold at the concentrations which are between 1 and 100 microM. Mechanistically, nifedipine causes this effect by prolonging the iron-transporting activity of DMT-1 [3]. Its main uses are as an antianginal (especially in Prinzmetal's angina) and as a antihypertensive. It works by relaxing the blood vessels, so that the heart does not have to pump as hard. It also increases the supply of blood and oxygen to the heart.

A prospective, non randomized, case control study was carried out to know the effectiveness and the safety of a single dose of 5mg Nifedipine(sublingual) in this subset of patients.

## MATERIALS AND METHODS

This study was carried out at Adesh Institute of Medical Sciences and Research between January 2010 to January 2011.

## INCLUSION CRITERIA

All the cases of chronic renal failure who were hypertensive, who were maintained on regular haemodialysis, who were aged 18 years and above, who had high systolic and diastolic blood pressures of more than >220 systolic and >125 diastolic respectively during haemo dialysis, were included in the study.

## EXCLUSION CRITERIA

**The patients who were:-**

- 1) Haemo-dynamically unstable
- 2) Known cases of Coronary Artery Disease
- 3) Aged below 18 years

The patients were monitored for 5 hours. They were treated with a single dose of nifedipine (5mg sublingual route). They were closely monitored for possible side effects. The patients had

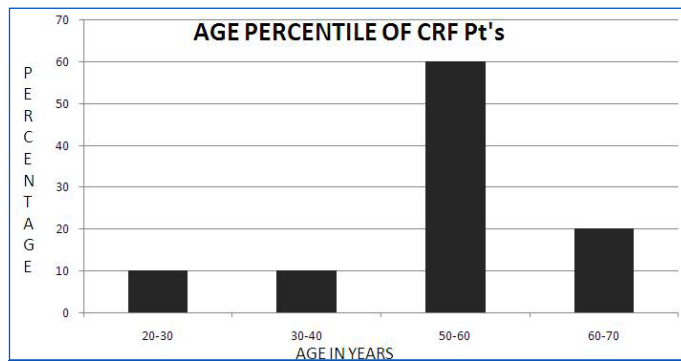
high blood pressure during haemodialysis and were already on antihypertensives. A single dose of 5mg nifedipine was given to control the blood pressure. The extended release formulations of nifedipine were asked to be taken on an empty stomach, and the patients were warned not to consume anything which contained grapefruit or grapefruit juice, as they raised the blood nifedipine levels [4]. The side effects of the drug were closely monitored. The side effects such as headache, palpitation, dizziness, hot flushes, vomiting, chest pain, allergic reactions, muscle cramps, giddiness, tachycardia, hypotension, etc were witnessed.

### RESULTS AND OBSERVATION

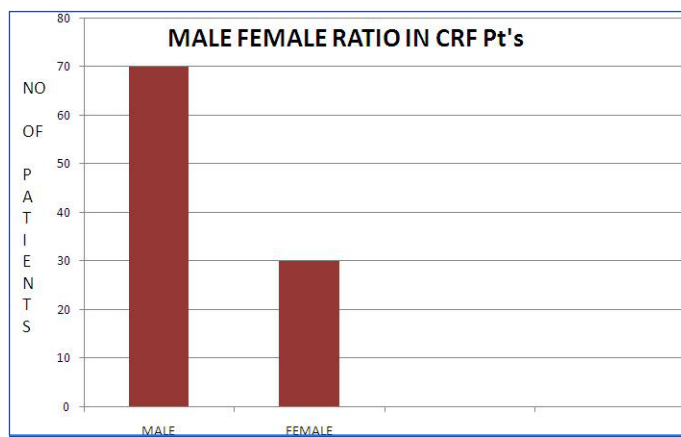
During the study period, about 100 patients of hypertension were on haemodialysis and they were observed, whose results have been shown in [Table/Fig-1] and in the [Table/Fig-2,3,4,5,6 & 7]. These patients were in the age group of 20-70 years. The maximum number of patients was seen in the 50-60 years age group [Table/Fig-2]. Out of the 100 patients, 30% were females and the rest (70%) were males [Table/Fig-3]. The chronic renal failure pa-

Headache	2 (2%)
Palpitation	1 (1%)
Dizziness	1 (1%)
Hot flushes	0
Vomiting	2 (2%)
Chest Pain	0
Allergic Reaction	1 (1%)
Muscle cramps	1 (1%)
Giddiness	1 (1%)
Tachycardia	1 (1%)
Asymptomatic	89 (89%)
Hypotension	1 (1%)

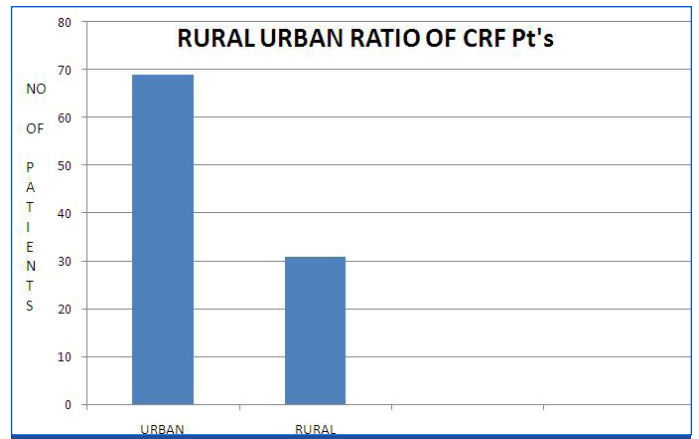
[Table/Fig-1]: Symptoms



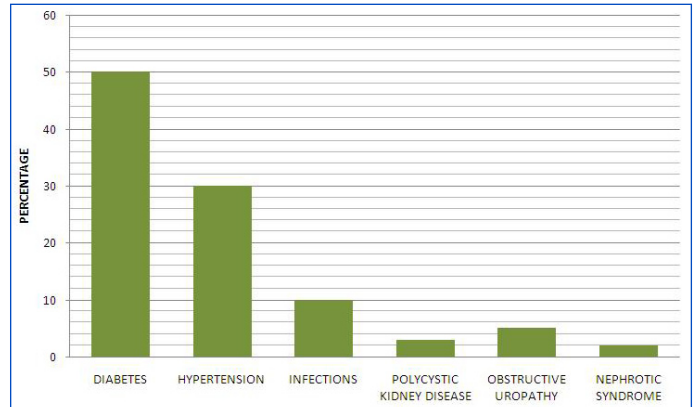
[Table/Fig-2]: Age Percentile of Crf Pt's



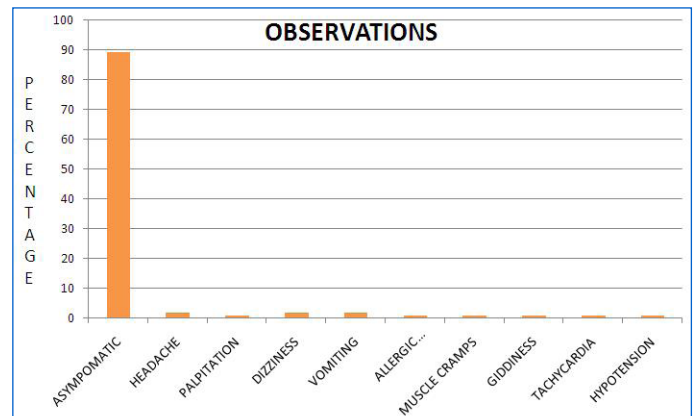
[Table/Fig-3]: Male Female Ratio in Crf Pt's



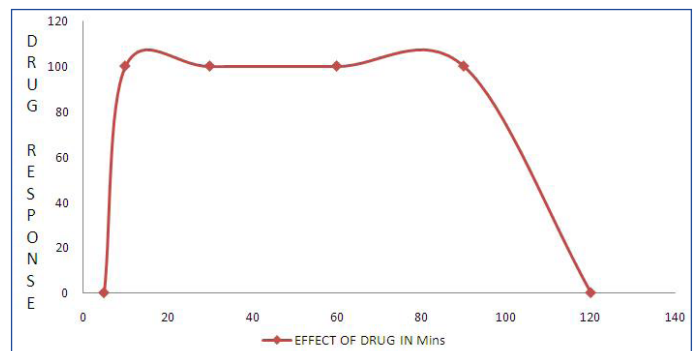
[Table/Fig-4]: Rural Urban Ratio of Crf Pt's



[Table/Fig-5]: Prevalence of Chronic Renal Failure



[Table/Fig-6]: Observations



[Table/Fig-7]: Effect of Drug In Mins

tients were more from the urban population than from the rural population [Table/Fig-4]. A maximum number of patients suffered from diabetes, followed by hypertension [Table/Fig-5]. Eighty nine patients were asymptomatic [Table/Fig-1] and [Table/Fig-2,3,4,5,6, 7]. The drug response can be seen in [Table/Fig-7].

## DISCUSSION

Hypertensive emergencies require an immediate lowering of the blood pressure in a controllable and a predictable manner. The initial goal of the treatment was to reduce the mean arterial pressure by no more than 25%, to reach a goal blood pressure of 160/100 mm Hg within 2 to 6 hours, or to decrease the diastolic blood pressure to 10-15% or to approximately 110mm Hg within 30-60 minutes [5,6]. A rapid fall in the blood pressure in patients with severe hypertension may result in a permanent ischaemic damage due to the disturbances in the auto-regulation of the cerebral blood flow [7]. In this circumstance, it is recommended that the blood pressure may not be lowered. Nifedipine has been widely used via an oral or sublingual administration in the management of hypertensive emergencies, severe hypertension which is associated with chronic renal failure, perioperative hypertension, and pregnancy induced hypertension [8,9]. A significant decrease in the blood pressure is usually observed 5–10 minutes after the nifedipine administration, with a peak effect in between 30 and 60 minutes and a duration of action of approximately 6–8 hours [10].

Sublingual nifedipine causes blood-pressure lowering through a peripheral vasodilation. It can cause an uncontrollable decrease in the blood pressure, reflex tachycardia, and a steal phenomenon in certain vascular beds. There have been multiple reports in the medical literature of serious adverse effects with sublingual nifedipine, which include cerebral ischaemia/infarction, myocardial infarction, complete heart block and death. Furberg et al., reported that in patients with coronary disease, the use of a short-acting nifedipine in moderate to high doses causes an increase in the total mortality [11]. As a result of this, The Cardiorenal Advisory Committee of the US Food and Drug Administration has concluded that the practice of administering sublingual/oral nifedipine should be abandoned, because this agent is neither safe nor efficacious [12-17].

However, this drug is not banned in India and it is widely used in a subset of patients like in those with pre-eclampsia, eclampsia and hypertensive emergencies and urgencies. We found that a low dose of sublingual Nifedipine (5mg) was very effective in controlling the blood pressure during haemodialysis and we also noticed that this drug had very minor side effects. Similarly, Samad and Shareef reported that sublingual nifedipine effectively and promptly lowers the elevated B.P. in a hypertensive crisis and that should it should be preferred over the costly cumbersome 1/V regimens which are used in hypertensive crisis [19-24].

## CONCLUSIONS

It can be concluded that sublingual nifedipine was effective and that it seemed to have less side effects. It may be an excellent drug for the urgent treatment of hypertensive emergencies in haemodialysis. If we administer an IV drug, it will add on to the fluid overload and decrease the blood pressure very rapidly, because the bio availability of a drug is almost 100 percent through the IV route. By the intramuscular and the oral routes, the effect will take 45 minutes to 1 hour to take place and so that was why we concluded that sublingual nifedipine was a better option for this subset of patients.

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