

Assessment of Efficacy of Amlodipine with Cilnidipine in Hypertensive Patients: A Comparative Study

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ABSTRACT

Introduction: The major problem encountered in treatment patients of hypertension and diabetic patients with hypertension is controlling their Systolic blood pressure (SBP) and Diastolic blood pressure (DBP). One of the calcium channel blockers (CCBs) with outstanding pharmacokinetic and pharmacodynamic profile is amlodipine. Cilnidipine is the newer generation of CCB that also inhibits sympathomimetic activity. Hence; we undertook the present study to evaluate the antihypertensive efficacy of amlodipine and cilnidipine in treating patients of hypertension.

Material and methods: The present study included assessment of 90 hypertensive patients that were undergoing treatment for the same. Auscultatory method with standard mercury sphygmomanometer was used for the measurement of the blood pressure. All the 90 patients were divided into two study groups with 45 patients in each group. The first group comprised of patients who were prescribed amlodipine 5–10 mg/day while the other group included patients who were given cilnidipine 10–20 mg/day orally as a treatment protocol for hypertension. The mean values of Systolic blood pressure (SBP) and Diastolic blood pressure (DBP) during check up were recorded and assessed. All the results were analyzed by SPSS software.

Results: A total of 90 patients were included in the present study. The mean SBP in the Amlodipine group patients and in the cilnidipine group patients was 139.1 and 144.2 mm of mercury respectively. The mean DBP in the Amlodipine group patients and in the cilnidipine group patients was 80.2 and 85.3 mm of mercury respectively. Non-significant results were obtained while comparing the mean SBO and DBP among patients of the two study groups. 28 patients in amlodipine group and 5 patients in the cilnidipine group showed the presence of edema.

Conclusion: In hypertensive patients, equal efficacy is exhibited by both amlodipine and cilnidipine in reduction of blood pressure.

Keywords: Amlodipine, Cilnidipine, Hypertensive

INTRODUCTION

One of the major problems encountered in treatment patients of hypertension and diabetic patients with hypertension is controlling their Systolic blood pressure (SBP) and Diastolic blood pressure (DBP).¹ Literature quotes numerous studies which show that for the maximum reduction in the clinical cardiovascular end points, a tight check and control of the blood pressure (BP) is required. One of the recent study indicated that approximately 14 percent reduction in the risk of stroke and ischemic attacks occurs by fall in approximately 2-mm Hg of average DBP. The same study also showed a simultaneous 6 percent reduction in risk of development of coronary artery disease. Data from various other studies also indicate that lowering of blood pressure might also be beneficial.²⁻⁵ Although a single drug treatment may be effective in controlling of blood pressure, some cases might require prescription of more than one drug for controlling the BP.²⁻⁶

One of the calcium channel blockers (CCBs) with outstanding

pharmacokinetic and pharmacodynamic profile is amlodipine. The only problem encountered with this medication is presence of peripheral edema. Data from various studies show that approximately upto 30 percent of the hypertensive cases on amlodipine shows the presence of peripheral edema. Cilnidipine is the newer generation of CCB that also inhibits sympathomimetic activity.⁷ Hence; we undertook the present study to evaluate the antihypertensive efficacy of amlodipine and cilnidipine in treating patients of hypertension.

MATERIAL AND METHODS

The present study was conducted in the department of medicine of the medical institute and included assessment of 90 hypertensive patients that were undergoing treatment for the same from June 2014 to July 2016. Ethical approval was taken from the institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. Inclusion criteria:

- New cases which were diagnosed as suffering from hypertension with Blood Pressure (BP) more than 140/90 mm of mercury,
- Patients in between the group of 35 to 70 years,
- Patients without any known drug allergy,
- Patients without history of any other systemic illness (except for hypertension)
- Patients with absence of pre-existing edema, nephritic syndrome, anaemia

Consultant physician examined all the patients and measured their blood pressure in the right arm in the sitting posture. Auscultatory method with standard mercury sphygmomanometer was used for the measurement of the blood pressure. Assessment of pedal edema was done by the clinical methods over the medial malleolus of both legs. All the cases were considered as positive for pedal edema in which pedal edema was present on either of the legs. Complete recording of all the demographic, personal and medical details of the patients was done after their initial screening. All the 90 patients were divided into two study groups with 45 patients in each group. The first group comprised of patients who were prescribed amlodipine 5–10 mg/day while the other group included patients who were given cilnidipine 10–20 mg/day orally as a treatment protocol for hypertension. All the patients were advised to take the prescribed medication as per instructions given by the consultant physician. Screening of all the patients was done every fortnight for the presence or

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absence of edema and control of blood pressure over a period of three months. The mean values of Systolic blood pressure (SBP) and Diastolic blood pressure (DBP) during check up were recorded and assessed. All the results were analyzed by SPSS software. Chi-square test and student t test were used for the assessment of level of significance. P-value of less than 0.05 was taken as significant.

RESULTS

A total of 90 patients were included in the present study. They were divided in two study groups with 45 patients in each group. Mean age of the patients in the Amlodipine group was 55.2 years while in the Cilnidipine group; the mean age of the patients was 52.7 years. Out of 45 patients, 18 were males and 27 were females in both the Amlodipine group and the Cilnidipine group respectively (Table 1). Table 2 and Graph 2 shows the comparative evaluation of antihypertensive efficacy of amlodipine with cilnidipine. The mean SBP in the Amlodipine group patients and in the cilnidipine group patients was 139.1 and 144.2 mm of mercury respectively. The mean DBP in the Amlodipine group patients and in the cilnidipine group patients was 80.2 and 85.3 mm of mercury respectively. Non-significant results were obtained while comparing the mean SBO and DBP among patients of the two study groups (p-value < 0.05). Graph 2 shows patients presenting with pedal edema in both groups. 28 patients in amlodipine group and 5 patients in the cilnidipine group showed the presence of edema.

DISCUSSION

Cessation of the amlodipine therapy is the usual protocol followed in controlling the peripheral edema observed in hypertensive patients with amlodipine-induced edema.^{8,9} An alternate drug is given for the management of hypertension in such patients.¹⁰ Although the incidence of edema is relatively lower with other CCBs when compared to amlodipine, replacement antihypertensives in these patients are typically drawn from a different class such as a thiazide diuretic or angiotensin converting enzyme inhibitor, in an attempt to avoid recurrence of edema. Cilnidipine is one of the CCBs which is approved for the therapy of essential hypertension.¹¹ Hence; we undertook the present study to evaluate the antihypertensive efficacy of amlodipine and cilnidipine in treating patients of hypertension.

In the present study, we observed that both amlodipine and cilnidipine exhibited equal efficacy in controlling the BP of the patients on hypertension (Table 2) (p-value < 0.05). However, incidence of peripheral edema was associated with amlodipine in comparison with cilnidipine (Graph 2). Adake P et al assessed and compared the efficacy amlodipine with cilnidipine in treating antihypertensive patients and also the incidence of pedal edema in those patients. In tertiary care centre of Karnataka, they analyzed 60 patients who were newly diagnosed with hypertension. They divided the patients into two study groups. The first group included 30 patients who were put on amlodipine therapy while the other group included 30 patients who were put on cilnidipine. They observed that pedal edema was present in 63.3 percent of the patients receiving amlodipine therapy while it was present only in 6.66 percent of the patients on cilnidipine therapy. They observed significant difference in the incidence of pedal edema in between the patients of the two study groups. However, they observed equal efficacy of both amlodipine and cilnidipine in reducing blood pressure in hypertensive individuals.¹² Anti-hypertensive effects of cilnidipine were investigated by Takei K et al, in

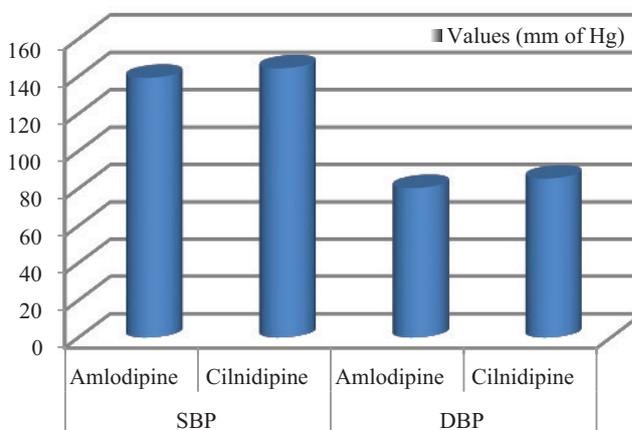
Parameter		Amlodipine	Cilnidipine
Number of patients		45	45
Mean age (years)		55.2	52.7
Gender	Males	18	18
	Females	27	27

Table-1: Demographic details of the patients

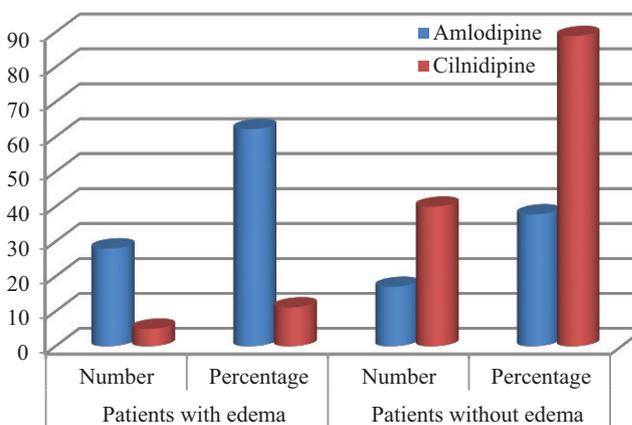
Blood pressure		Values (mm of Hg)	p-value
SBP	Amlodipine	139.1	0.58
	Cilnidipine	144.2	
DBP	Amlodipine	80.2	0.71
	Cilnidipine	85.3	

SBP: Systolic blood pressure, DBP: Diastolic blood pressure

Table-2: Comparative evaluation of antihypertensive efficacy of amlodipine with cilnidipine



Graph-1: Antihypertensive efficacy of amlodipine with cilnidipine



Graph-2: Patients presenting with pedal edema in both groups

hypertensive with chronic-stage cerebrovascular disease in a comparison with amlodipine. They administered amlodipine or cilnidipine to 78 hypertensive subjects undergoing outpatient treatment. Amlodipine or cilnidipine was also administered similarly, to 30 subjects having hypertension associated with a cerebral infarct which occurred more than one month earlier due to cerebral thrombosis or embolism. After 3 months administration, the subjects' blood pressures and pulse rates were recorded with an ambulatory blood pressure monitor over 24 hours. No difference was recognized in patient age, gender, and systolic and diastolic blood pressure before treatment between the groups. In the cilnidipine groups, no difference in

average 24-hour or waking systolic blood pressure values was seen between cerebrovascular disease (CVD) subjects and non-CVD subjects, although in the amlodipine groups, CVD subjects had significantly higher blood pressure values than non-CVD subjects. In the cilnidipine group, the coefficient of variation values of pulse rate were significantly higher in CVD subjects than in non-CVD subjects ($p < 0.05$). In patients with recent stroke, a Ca antagonist with no sympathetic nerve suppression had weaker blood pressure-lowering effects. Significantly increased pulse rate variability, shown in the CVD subjects administered cilnidipine, suggests that cilnidipine enhanced the parasympathetic function in hypertensive patients with CVD.¹³ Shetty R et al assessed whether edema caused by amlodipine therapy was resolved by cilnidipine while maintaining adequate control of hypertension. They conducted a prospective study on 27 patients who were diagnosed with essential hypertension with presence of amlodipine-induced edema. In all the cases, they substituted Amlodipine therapy with cilnidipine therapy. At the onset of the study and after one month of the study, clinical assessment of ankle edema, blood pressure, and pulse rate was done. Resolution of edema took place in all the 27 cases. Along with this, they observed a significant decrease in the bilateral ankle circumference and body weight. However, they didn't observe any significant defence in the mean arterial blood pressure and pulse rate. From the results, they concluded that in treating antihypertensive for patients with amlodipine-induced edema, Cilnidipine is an acceptable alternative.¹⁴ Suppression oxidative stress and exertion of renoprotective effect by cilnidipine was hypothesized by Soeki T et al. They assessed a total of 35 hypertensive patients that received renin-angiotensin system inhibitor. They randomly divided these 35 patients into two study group. One group consisted of patients that were given cilnidipine ($n = 18$) while the other group consisted of patients that were given amlodipine ($n = 17$). 130/85 mm Hg was the targeted BP set. A significant reduction in the SBP and DBP was seen in both the study groups when assessed after six months. They observed non-significant difference in the efficacy of the two drugs is controlling the BP. However, in terms of renoprotective effect, they observed that cilnidipine exerted a higher effect by the virtue of its antioxidative properties.^{15,16}

CONCLUSION

From the above results, the authors concluded that in hypertensive patients, equal efficacy is exhibited by both amlodipine and cilnidipine in reduction of blood pressure although incidence of associated peripheral edema is higher in patients on amlodipine.

REFERENCES

1. Rajneesh Jindal, Neera Jindal, Ankur Dass. Prevalence of hypertension and its association with various risk factors a survey in Uttar Pradesh. *International Journal of Contemporary Medical Research*. 2016;3:3410-3412.
2. Cook NR, Cohen J, Hebert PR, Taylor JO, Hennekens CH. Implications of small reductions in diastolic blood pressure for primary prevention. *Arch Intern Med*. 1995;155:701-709.
3. Norris K, Neutel JM. Emerging Insights in the First-Step Use of Antihypertensive Combination Therapy. *J Clin Hypertens (Greenwich)*. 2007;9(12 Suppl 5):5-14.
4. Littlejohn TW, Majul CR, Olvera R, Seeber M, Kobe M, Guthrie R, Oigman W. Results of Treatment With Telmisartan-Amlodipine in Hypertensive Patients. *The journal of clinical hypertension*. 2009;11:207-213.
5. Tirthankar Guha Thakurta, Pulak Panda. Study of

relationship among hypertension, overweight and obesity in individuals of different age groups. *International Journal of Contemporary Medical Research*. 2017;4:733-736.

6. Ishimitsu T, Yagi S, Ebihara A, Doi Y, Domae A, Shibata A, Kimura M, Sugishita Y, Sagara E, Sakamaki T, Murata K. Long-term evaluation of combined antihypertensive therapy with lisinopril and a thiazide diuretic in patients with essential hypertension. *Jpn Heart J*. 1997;38:831-840.
7. Osterloh I. The safety of amlodipine. *Am Heart J*. 1989;118:1114-9.
8. Sener D, Halil M, Yavuz BB, Cankurtaran M, Arioğul S. Anasarca edema with amlodipine treatment. *Ann Pharmacother*. 2005;39:761-3.
9. Opie LH, Gersh BJ. *Drugs for the Heart*. 6th ed. New York, NY: Elsevier Saunders; 2004. Calcium channel blockers (Calcium antagonists) pp. 50-79.
10. Kubota K, Pearce GL, Inman WH. Vasodilation-related adverse events in diltiazem and dihydropyridine calcium antagonists studied by prescription-event monitoring. *Eur J Clin Pharmacol*. 1995;48:1-7.
11. Chrysant SG, Cohen M. Sustained blood pressure control with controlled-release isradipine. *Am J Hypertens*. 1995;8:87-9.
12. Adake P, Somashekar HS, Mohammed Rafeeq PK, Umar D, Basheer B, Baroudi K. Comparison of amlodipine with cilnidipine on antihypertensive efficacy and incidence of pedal edema in mild to moderate hypertensive individuals: A prospective study. *Journal of Advanced Pharmaceutical Technology and Research*. 2015;6:81-85.
13. Takei K1, Araki N, Ohkubo T, Tamura N, Yamamoto T, Furuya D, Yanagisawa CT, Shimazu K. Comparison of the anti-hypertensive effects of the L/N-type calcium channel antagonist cilnidipine, and the L-type calcium channel antagonist amlodipine in hypertensive patients with cerebrovascular disease. *Intern Med*. 2009;48:1357-61.
14. Shetty R, Vivek G, Naha K, Tumkur A, Raj A, Bairy KL. Excellent Tolerance to Cilnidipine in Hypertensives with Amlodipine - Induced Edema. *North American Journal of Medical Sciences*. 2013;5:47-50.
15. Soeki T1, Kitani M, Kusunose K, Yagi S, Taketani Y, Koshiba K, Wakatsuki T, Orino S, Kawano K, Sata M. Renoprotective and antioxidant effects of cilnidipine in hypertensive patients. *Hypertens Res*. 2012;35:1058-62.
16. R. Jayanthi, A. Mohammed Kalifa, B.M. Archana, Sindhiya Jayachandran, Flaicy Varghesse. Prevalence and severity of amlodipine induced gingival overgrowth. *International Journal of Contemporary Medical Research*. 2017;4:377-379.

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