

COMPARISON OF SAFETY AND EFFICACY OF ANTI HYPERTENSIVE DRUG
COMBINATIONS (DIURETICS, CCBS, ARBS, BETA BLOCKERS,) IN PATIENTS
WITH HYPERTENSION: A PROSPECTIVE OBSERVATIONAL STUDYK. Pavithra^{1*}, R. Jenelia Williams¹, Dr. C. Venkatesh², Dr. N. M. Vageesh³, Dr. B. Srinivasulu⁴¹Pharm D. Intern, Department of Pharmacy Practice, St. Johns College of Pharmaceutical Sciences, Yerrakota,
Yemmiganur 518360, Kurnool district, Andhra Pradesh, India.²Associate Professor, Department of Pharmacy Practice, St. Johns College of Pharmaceutical Sciences, Yerrakota,
Yemmiganur 518360, Kurnool district, Andhra Pradesh, India.***Corresponding Author: K. Pavithra**Pharm D. Intern, Department of Pharmacy Practice, St. Johns College of Pharmaceutical Sciences, Yerrakota,
Yemmiganur 518360, Kurnool district, Andhra Pradesh, India.DOI: <https://doi.org/10.5281/zenodo.23801661>**How to cite this Article:** K. Pavithra^{1*}, R. Jenelia Williams¹, Dr. C. Venkatesh², Dr. N. M. Vageesh³, Dr. B. Srinivasulu⁴
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ABSTRACT

Aim: Persistent hypertension increases the likelihood of cardiovascular events and kidney complications. If one medicine does not provide sufficient control, clinicians may prescribe a combination of antihypertensive agents. Decisions about therapy should account for blood-pressure response as well as tolerability. **Objective:** This study examined changes in blood pressure and serum creatinine during follow-up, the proportion of patients meeting the recorded blood-pressure target, and adverse effects documented for selected antihypertensive regimens. **Methods and Methodology:** A prospective observational study lasting six months was carried out at Aditya Nursing Home in Adoni, Andhra Pradesh. Records for 79 adults aged 35–95 years receiving inpatient or outpatient hypertension care were analysed. Information was abstracted from prescriptions, clinical documentation, laboratory results, and blood-pressure measurements. Assessments were documented at baseline and at follow-up, including visits at about one and three months. The project identified paired t-tests and one-way analysis of variance (ANOVA) as the planned analyses; individual patient data were not available to repeat these calculations independently. **Results And Discussion:** Both systolic and diastolic readings were lower at follow-up across all five regimens: telmisartan/hydrochlorothiazide, amlodipine/atenolol, telmisartan/amlodipine, telmisartan/chlorthalidone, and telmisartan/metoprolol succinate. The recorded systolic reduction was 40 mmHg for telmisartan/amlodipine (160 to 120 mmHg) and for telmisartan/chlorthalidone (180 to 140 mmHg). Average serum creatinine showed relatively small changes, with increases noted in the two groups receiving diuretics. According to the target-control table, 67 of 79 participants (84.8%) met the stated target. However, treatment-group totals are inconsistent across tables and must be checked against the original records. **Conclusion:** The project tables indicate lower follow-up blood pressure in each of the five treatment groups. A substantial systolic change was recorded for telmisartan/amlodipine, while mean creatinine rose slightly in some groups treated with diuretics. Given the observational design and unresolved discrepancies in the tables, these findings should be viewed as descriptive and cannot establish that one combination is better than another.

KEYWORDS: hypertension; anti hypertensive agents; combination therapy; blood pressure; safety.**INTRODUCTION**

Hypertension is a long-term disorder that contributes to the risk of stroke, myocardial infarction, heart failure, and chronic kidney disease. Effective reduction of

elevated blood pressure is an important part of lowering cardiovascular risk. The choice of treatment is guided by the degree of hypertension, coexisting conditions, contraindications, patient tolerance, and individual

preferences. Drug classes used in practice include angiotensin receptor blockers (ARBs), calcium channel blockers (CCBs), thiazide and thiazide-like diuretics, and beta-blockers; selected agents from different classes can be prescribed together when appropriate.^[1-3,6,7,17,18]

Combining medicines that act through different pathways may improve blood-pressure control, but clinicians must also monitor for unwanted effects and changes in laboratory measurements. Examples include pairing an ARB with a CCB or using a renin-angiotensin system blocker alongside a diuretic. Beta-blockers can be useful when a patient has a relevant additional indication, including some cardiac disorders, although they are not interchangeable with every other antihypertensive class for all patients. Follow-up assessment should include blood pressure, medicine-taking behaviour, symptoms, and appropriate tests of renal function and electrolytes.^[2-5]

Research based on routine care can show how antihypertensive regimens are used and how patients fare in clinical settings. Nevertheless, differences in initial blood pressure, coexisting illnesses, prescribing choices, and the number of patients in each group can complicate comparisons. Published work has examined telmisartan with amlodipine and treatment plans that include diuretics, including three-drug regimens.^[9-16] Pharmacology references also outline the actions and clinical use of these medicine classes.^[17,18] Against this background, the current study reports observed blood-pressure changes and selected safety indicators in patients treated with different combinations at a single hospital.^[1,2]

MATERIALS AND METHODS

Study design and setting

The study followed patients prospectively for six months in the General Medicine Department of Aditya Nursing Home, Adoni, Andhra Pradesh, India. The analysed cohort consisted of 79 men and women aged 35–95 years who were receiving inpatient or outpatient treatment for diagnosed hypertension.

Inclusion Criteria

Patients admitted to the General Medicine ward qualified if aged -35-95 years
Both genders
In-patients, Out- patients (known case of HTN)
diagnosed with Hypertension

Exclusion Criteria

Table 1: Blood pressure at baseline and follow-up by antihypertensive combination.

Combination (dose as recorded)	n in the blood-pressure table	Baseline SBP/DBP (mmHg)	1-month SBP/DBP (mmHg)	3-month SBP/DBP (mmHg)	Reported p-value (SBP; DBP)
Telmisartan + hydrochlorothiazide (50 + 12.5 mg)	7	160/90	150/80	140/70	0.0048; 0.0062
Amlodipine + atenolol (dose notation in source: 50 + 5 mg)	17	170/90	150/80	140/80	0.001; 0.005

Pregnant or lactating women unconscious patients those unable to comply due to mental retardation patients with Non Hypertensive Patients were excluded.

Data collection and outcomes

Study information was extracted from case-report forms, medication orders, laboratory reports, and clinical notes. Variables included baseline and subsequent systolic and diastolic blood pressure, whether the documented target was reached, serum creatinine, age, comorbid conditions, and recorded adverse effects. The five combinations evaluated were telmisartan/hydrochlorothiazide, amlodipine/atenolol, telmisartan/amlodipine, telmisartan/chlorthalidone, and telmisartan/metoprolol succinate.

Statistical Analysis

According to the project, paired t-tests and one-way ANOVA were planned for the analysis. The p-values in this manuscript remain as they appeared in the supplied material because the patient-level dataset was not available for recalculation. The authors should compare group totals, p-value formatting, test selection, and statistical assumptions with the original dataset before submission. Any claims of statistical significance should be made only after these checks.

Ethics

The dissertation contains an Institutional Human Ethics Committee certificate bearing the registration number “SJCP/IEC/V PD/2024-/043C” as written in the source. Verify the exact registration number, approval date, consent procedures, and whether approval was granted before enrolment began. Patient names and hospital identification numbers are not included in this manuscript.

RESULTS

Study population and Comorbidities

The analysed population is reported as 79 patients, matching the sum of the five group sizes in the blood-pressure table (7, 17, 18, 13, and 24). The target-control table also totals 79 patients, but the numbers assigned to individual treatment groups do not consistently match those in the blood-pressure table. These discrepancies must be checked against the original case records. Until they are resolved, treatment-specific comparisons should be interpreted cautiously.

Telmisartan + amlodipine (40 + 5 mg)	18	160/90	140/90	120/80	0.0000000112; 0.0000496
Telmisartan + chlorthalidone (40 + 12.5 mg)	13	180/90	160/90	140/80	0.00003; 0.0126
Telmisartan + metoprolol succinate (40 + 25 mg)	24	160/90	140/80	130/80	0.03; 0.005

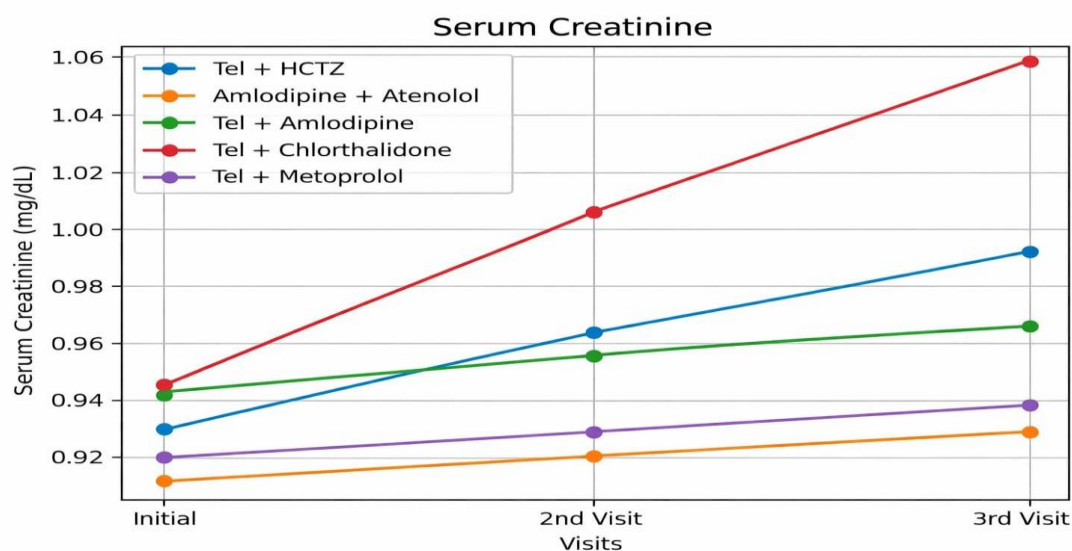
Note: Values are transcribed from the project tables and have not been recalculated. The amlodipine/atenolol dose entry (recorded in the source as 50 + 5 mg) is unclear and should be checked against the prescriptions. Some p-values in the narrative differ in rounding or format from those in the detailed table.

At the third visit, systolic blood pressure was lower than at baseline in all five groups. The largest recorded

decreases were 40 mmHg in the telmisartan/amlodipine and telmisartan/chlorthalidone groups. In the telmisartan/amlodipine group, diastolic blood pressure decreased from 90 to 80 mmHg by the third visit. These unadjusted observations do not establish comparative superiority because treatment was not randomized and the groups may have differed at baseline.

Table 2: Serum creatinine across study visits, as reported.

Combination	n as reported	Baseline (mg/dL)	1 month (mg/dL)	3 months (mg/dL)	Reported p-value
Telmisartan + hydrochlorothiazide	7	0.92 ± 0.12	0.96 ± 0.11	0.99 ± 0.10	0.04
Amlodipine + atenolol	17	0.90 ± 0.10	0.91 ± 0.09	0.92 ± 0.08	0.20
Telmisartan + amlodipine	18	0.94 ± 0.13	0.95 ± 0.12	0.96 ± 0.11	0.24
Telmisartan + chlorthalidone	13	0.95 ± 0.14	1.01 ± 0.13	1.06 ± 0.12	0.02
Telmisartan + metoprolol succinate	24	0.91 ± 0.11	0.92 ± 0.10	0.93 ± 0.09	0.18



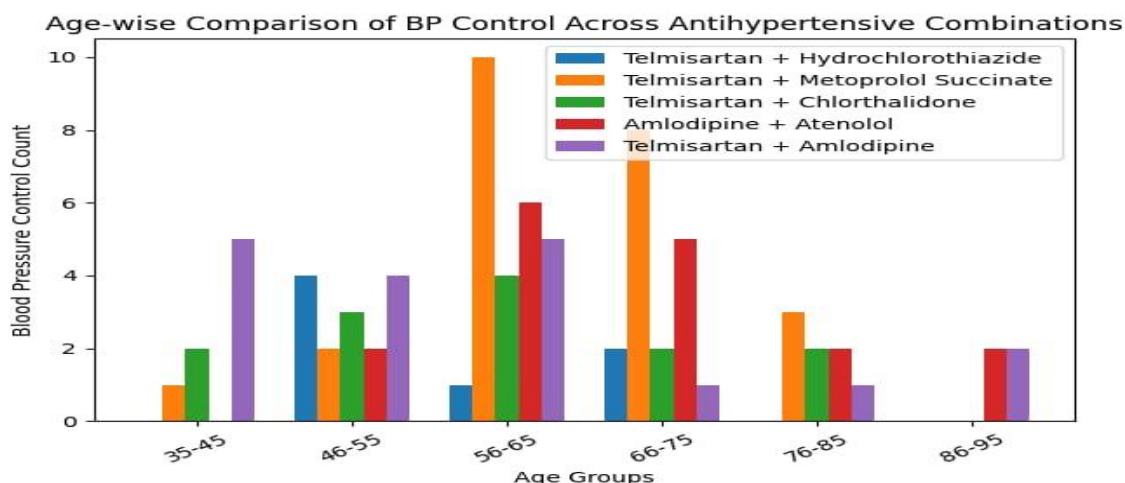
Mean serum creatinine increased slightly during the observation period. The largest changes were reported in the telmisartan/chlorthalidone group (0.95 to 1.06 mg/dL) and the telmisartan/hydrochlorothiazide group (0.92 to 0.99 mg/dL), with reported p-values of 0.02 and 0.04, respectively. These group averages alone cannot establish drug-related kidney injury or confirm renal

safety. Interpretation requires individual renal-function data, estimated glomerular filtration rate, electrolyte results, clinical context, and validation of the statistical analysis.

Table 3: Achievement of the target blood pressure, as reported.

Combination	Patients in target table	Target achieved n (%)	Not achieved n (%)
Telmisartan + hydrochlorothiazide	18	16 (88.9)	2 (11.1)
Telmisartan + metoprolol succinate	7	7 (100.0)	0 (0.0)
Telmisartan + chlorthalidone	13	9 (69.2)	4 (30.8)

Combination	Patients in target table	Target achieved n (%)	Not achieved n (%)
Amlodipine + atenolol	17	16 (94.1)	1 (5.9)
Telmisartan + amlodipine	24	19 (79.2)	5 (20.8)
Total in this table	79	67 (84.8)	12 (15.2)

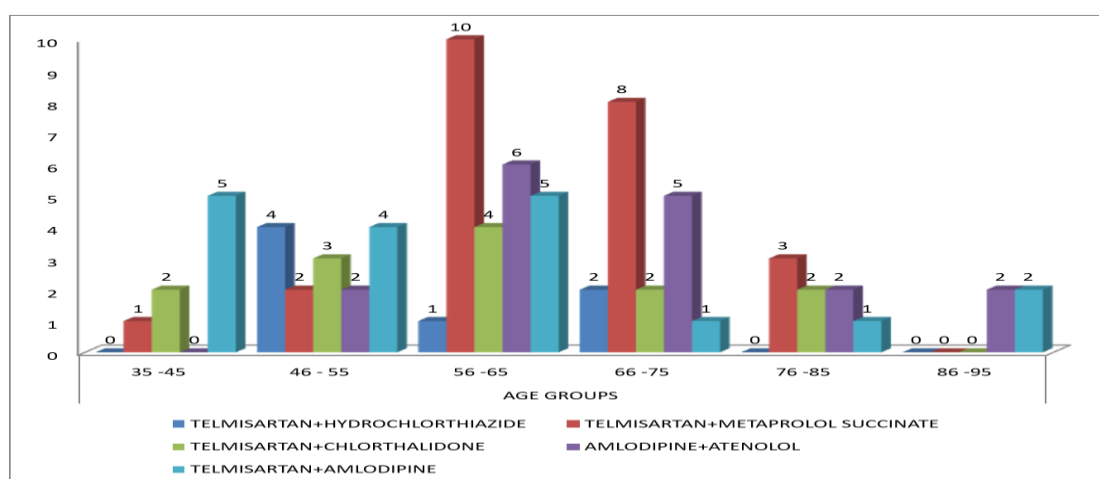


According to the target-control table, 67 of 79 patients (84.8%) reached the study-reported target. The table recorded target achievement in all seven patients assigned to telmisartan/metoprolol succinate and in 16 of

17 patients receiving amlodipine/atenolol. These proportions are based on small groups and should not be interpreted as reliable rankings of treatment effectiveness.

Table 4: Age distribution by prescribed combination (counts as reported).

Combination	35–45 y	46–55 y	56–65 y	66–75 y	76–85 y	86–95 y
Telmisartan + hydrochlorothiazide	0	4	1	2	0	0
Telmisartan + metoprolol succinate	1	2	10	8	3	0
Telmisartan + chlorthalidone	2	3	4	2	2	0
Amlodipine + atenolol	0	2	6	5	2	2
Telmisartan + amlodipine	5	4	5	1	1	2



In the recorded age counts, the telmisartan/metoprolol succinate group had the greatest representation in the 56–75-year age bands, whereas the telmisartan/amlodipine

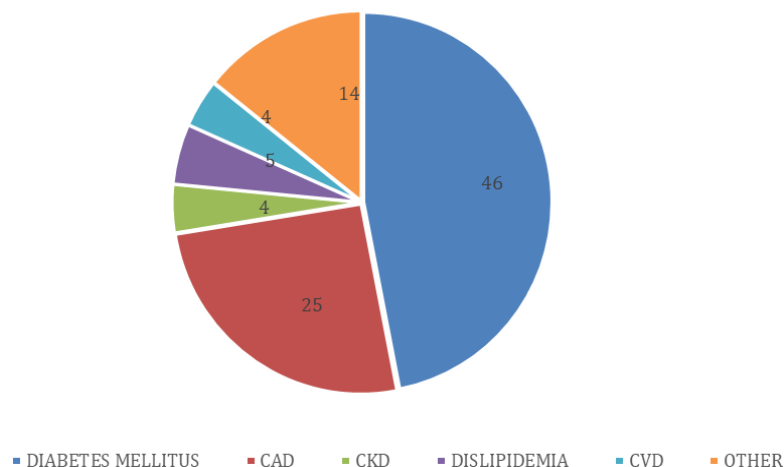
group had the highest count in the 35–45-year age band. These figures describe the distribution of participants; they do not measure treatment response by age.

Table 5: Comorbidities recorded in the project.

Comorbidity	Count	Percentage as reported
Diabetes mellitus	46	47%
Coronary artery disease (CAD)	25	26%

Chronic kidney disease (CKD)	4	5%
Dyslipidaemia	5	4%
Cardiovascular disease (CVD)	4	4%
Other	14	14%

COMORBIDITIES



The comorbidity counts sum to 98, which exceeds the reported study population of 79; clarify whether patients could have more than one comorbidity or whether the counts need correction. The percentages in the source do not consistently correspond to the reported counts or a clearly defined denominator and should be recalculated from verified records. The project mentions dizziness, fatigue, constipation, nausea, headache, insomnia, and increased thirst, but does not provide complete event counts for each treatment group. Therefore, adverse-event rates cannot be compared reliably using the available information.

DISCUSSION

In this single-hospital observational sample, systolic blood pressure at the third visit was below baseline in each of the five treatment groups. The telmisartan/amlodipine group was recorded at 120/80 mmHg at the third visit, a 40-mmHg systolic reduction from baseline. The telmisartan/chlorthalidone group also showed a 40-mmHg reduction, from 180 to 140 mmHg. These numerical changes are descriptive only: treatment allocation was not random, baseline measurements differed, and the group totals are not consistent across tables.^[1-5,9-16]

The target-control summary states that 67 of 79 patients (84.8%) achieved the recorded blood-pressure goal. Control was reported for all seven patients in the telmisartan/metoprolol group, although such a small group gives an uncertain estimate. A high proportion was also listed for amlodipine/atenolol. Any comparison between regimens requires reconciled group totals, an explicit definition of the target, confirmation of

assessment times, and consideration of age, starting blood pressure, comorbidities, and other treatments.

The source tables show small increases in average serum creatinine over the follow-up period. The greatest rise was listed for telmisartan/chlorthalidone, from 0.95 to 1.06 mg/dL, followed by telmisartan/hydrochlorothiazide, from 0.92 to 0.99 mg/dL. Creatinine values may be influenced by hydration, acute illness, and a patient's underlying kidney status, so group means alone cannot confirm medicine-induced renal injury or prove that a regimen is safe. If available, interpretation should also use estimated glomerular filtration rate, electrolyte measurements, and counts of patients with clinically meaningful changes.^[1,8]

Several potential adverse effects are mentioned in the project, but the available tables lack complete counts by treatment group, severity information, causality evaluations, and details of any medicine discontinuations. The safety comparison is therefore limited. Future data collection should record each event's onset, intensity, suspected drug, management, and outcome, and should apply a prespecified method for assessing causality. Comorbidity percentages also need to be recalculated because some do not agree with the listed counts.^[1,8]

An advantage of this work is the prospective collection of blood-pressure and laboratory measurements during follow-up. Important weaknesses include recruitment at one centre, unequal numbers across treatment groups, non-random treatment assignment, incomplete adverse-effect records, and lack of individual-level data with which to check the statistical findings. The overall

sample is reported as 79, but treatment-group counts conflict between tables. Original records should be used to reconcile the dataset, dose descriptions, comorbidity percentages, and statistical analyses before drawing firm conclusions.

CONCLUSION

Across the available records, follow-up blood pressure was lower than baseline for all five antihypertensive combinations. The tables show a marked reduction with telmisartan/amlodipine and modest rises in average serum creatinine in some groups receiving diuretics. Because the study was observational and the source tables contain inconsistencies, the results do not establish superiority of any regimen. Before the manuscript is submitted, treatment assignments and doses should be confirmed, comorbidity percentages recalculated, adverse-event counts checked, and statistical results verified using the original dataset.

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Conflict Of Interest

The authors declare that they have no conflicts of interest related to the conduct of this study, the analysis of the data, or the publication of this manuscript.

Ethical Approval

The study was conducted at Aditya Nursing Home, Adoni, Andhra Pradesh, India. The details of approval by the Institutional Human Ethics Committee, including the approval reference number SJCP/IEC/V PD/2025-2026/050B and 01/11/25 To 30/04/26 (6 Months), are being verified against the original documentation.

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