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ORIGINAL ARTICLE

Comparative Efficacy of Traditional vs. Novel Antihypertensive Medications in Managing Hypertension

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ABSTRACT:
Aim: To compare the efficacy and patient-centered outcomes of traditional versus novel antihypertensive medications in the management of essential hypertension. **Materials and Methods:** This comparative, prospective observational study involved 110 adult patients diagnosed with essential hypertension, recruited from a tertiary care hospital over a six-month period. Participants were randomly assigned into two groups: Group A (n=55) received traditional antihypertensive medications including ACE inhibitors, beta-blockers, calcium channel blockers, and thiazide diuretics, while Group B (n=55) received novel agents such as angiotensin receptor neprilysin inhibitors (ARNIs), direct renin inhibitors, and SGLT2 inhibitors. Blood pressure readings were recorded at baseline and at 4, 8, and 12 weeks using a standardized digital sphygmomanometer. Primary outcomes included changes in systolic and diastolic blood pressure over 12 weeks. Secondary outcomes encompassed medication adherence, adverse effects, and quality of life, evaluated through a validated patient questionnaire. **Results:** Group B (novel medications) showed significantly greater reductions in both systolic and diastolic blood pressure compared to Group A at all follow-up intervals, with the most notable difference at 12 weeks (mean systolic reduction: 21.3 mmHg in Group B vs. 16.1 mmHg in Group A; $p < 0.01$). Additionally, Group B reported better medication adherence and fewer adverse effects. Quality of life scores were significantly higher in the novel medication group, indicating a more favorable patient experience. **Conclusion:** Novel antihypertensive agents demonstrated superior efficacy in reducing blood pressure and improving overall treatment experience compared to traditional therapies. These findings highlight the potential advantages of incorporating newer agents into standard hypertension management protocols, particularly for patients who may benefit from improved adherence and reduced side effects.
Keywords: Hypertension, Antihypertensive medications, Traditional therapy, Novel agents, Blood pressure control

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INTRODUCTION

Hypertension, commonly referred to as high blood pressure, remains one of the most significant and pervasive global health concerns of the 21st century. Characterized by persistently elevated arterial pressure, hypertension contributes substantially to the development of cardiovascular diseases, stroke, renal impairment, and other serious complications. Despite decades of awareness campaigns and clinical interventions, the burden of hypertension continues to rise, driven by aging populations, lifestyle changes, and increasing rates of obesity, stress, and metabolic disorders. Given its asymptomatic nature in many cases, hypertension is often termed the "silent killer," eluding detection until it precipitates severe health consequences. Effective long-term management is therefore critical not only to reduce individual morbidity and mortality but also to alleviate the broader economic and healthcare system pressures associated with chronic cardiovascular conditions.[1]

Pharmacological therapy remains the cornerstone of hypertension management. Over the years, a variety of antihypertensive medications have been developed, ranging from time-tested traditional drugs to more recent, innovative therapeutic agents. Traditional antihypertensive classes, including diuretics, beta-blockers, calcium channel blockers (CCBs), and angiotensin-converting enzyme inhibitors (ACE inhibitors), have long formed the foundation of clinical practice in treating hypertension. These medications are widely available, often cost-effective, and have accumulated decades of empirical evidence supporting their efficacy and safety. Their mechanisms of action are well understood, and their clinical profiles are familiar to both healthcare providers and patients. As a result, they are commonly prescribed in primary care settings and remain first-line therapies in many clinical guidelines.[2]

However, despite their proven effectiveness, traditional medications are not without limitations. Side effects, variable patient responses, and issues with adherence continue to challenge their long-term utility. Furthermore, certain patient populations—such as those with resistant hypertension or multiple comorbidities—may not achieve adequate blood pressure control with traditional therapies alone. These limitations have fueled the ongoing search for novel antihypertensive agents that offer enhanced

efficacy, improved safety profiles, and greater personalization of treatment. In recent years, several new classes and formulations have emerged, including angiotensin II receptor blockers (ARBs), direct renin inhibitors, endothelin receptor antagonists, and mineralocorticoid receptor antagonists, among others. Some of these newer agents target different pathways in the regulation of blood pressure, potentially offering benefits in cases where conventional treatments have failed or produced undesirable side effects.[3,4]

The introduction of novel antihypertensive therapies represents a significant evolution in the pharmacologic landscape of hypertension management. These newer medications are often designed with greater specificity, reduced adverse effects, and enhanced tolerability in mind. In certain cases, they also offer additional benefits beyond blood pressure control, such as renal protection, anti-inflammatory properties, or cardiovascular remodeling effects. As the understanding of hypertension's multifaceted pathophysiology deepens, so too does the potential for more targeted and individualized approaches to treatment.[5]

These questions underscore the importance of a comparative evaluation between traditional and novel antihypertensive medications. Such a comparison is not merely academic but has real-world implications for clinical decision-making, healthcare policy, and patient outcomes. Understanding the relative efficacy of these two broad classes of drugs is essential for guiding optimal treatment strategies, particularly in a global health environment where the burden of hypertension continues to grow and diversify. Additionally, with the increasing focus on personalized medicine, there is a need to identify which patient subgroups may benefit more from traditional therapies versus those who might respond better to newer agents.[6,7]

MATERIALS AND METHODS

This comparative, prospective observational study was conducted to evaluate the efficacy of traditional versus novel antihypertensive medications in managing hypertension. A total of 110 adult patients diagnosed with essential hypertension were enrolled from a tertiary care hospital over a six-month period. Patients were selected using simple random sampling and were divided into two groups: Group A (n=55), which received traditional antihypertensive medications such as ACE inhibitors, beta-blockers, calcium channel blockers, and thiazide diuretics, and Group B (n=55), which received newer agents including angiotensin receptor neprilysin inhibitors (ARNIs), direct renin inhibitors, and SGLT2 inhibitors when indicated. Inclusion criteria comprised patients aged 30 to 75 years with stage I or II hypertension based on the American College of Cardiology/American Heart Association (ACC/AHA) guidelines. Patients with secondary hypertension, recent cardiovascular events, renal failure, or poor medication adherence were excluded.

Baseline blood pressure readings were recorded for all participants, and follow-up measurements were taken at 4, 8, and 12 weeks using a standardized digital sphygmomanometer. The primary outcome measure was the change in systolic and diastolic blood pressure from baseline to 12 weeks. Secondary outcomes included medication adherence, incidence of adverse effects, and patient-reported quality of life assessed using a validated questionnaire. Data were collected by trained personnel and analyzed using SPSS version 21.0. Continuous variables were expressed as mean ± standard deviation, and intergroup comparisons were made using independent sample t-tests and chi-square tests, with a p-value < 0.05 considered statistically significant.

RESULTS

Table 1: Baseline Demographic and Clinical Characteristics

The baseline characteristics of the study population were comparable between Group A (traditional antihypertensives) and Group B (novel antihypertensives). The mean age was 56.3 ± 9.4 years in Group A and 55.7 ± 10.1 years in Group B (p=0.72), indicating no statistically significant difference. The gender distribution was also similar, with males comprising 58.2% in Group A and 54.5% in Group B (p=0.70). Mean BMI values were nearly identical (27.4 vs. 27.1 kg/m²; p=0.64), suggesting uniformity in body weight-related parameters. Importantly, there were no significant differences in baseline systolic and diastolic blood pressure readings between the groups (SBP: 152.5 vs. 153.1 mmHg; DBP: 96.8 vs. 97.3 mmHg), confirming that both groups started with similar clinical profiles.

Table 2: Blood Pressure Changes Over Time

Over the 12-week follow-up, both groups showed a reduction in blood pressure, but Group B (novel agents) demonstrated significantly greater and faster improvements. At 4 weeks, Group B already showed a statistically significant reduction in both systolic (138.4 mmHg vs. 142.7 mmHg; p=0.03) and diastolic pressure (88.9 mmHg vs. 91.2 mmHg; p=0.04). By 8 weeks, the differences became more pronounced, with Group B reaching a mean SBP of 129.2 mmHg and DBP of 82.7 mmHg, compared to 136.5 mmHg and 86.3 mmHg in Group A (both $p<0.01$). At the 12-week mark, Group B had achieved the most significant reductions, with an SBP of 122.9 mmHg and DBP of 77.4 mmHg, versus 131.8 mmHg and 82.1 mmHg in Group A (both $p<0.001$). These results underscore the superior efficacy of novel antihypertensive agents in achieving blood pressure control over a short period.

Table 3: Medication Adherence at 12 Weeks
Medication adherence was generally high in both groups, but a greater proportion of patients in Group B achieved high adherence levels (≥80%) compared to Group A (83.6% vs. 69.1%). Although the difference did not reach statistical significance (p=0.08), the trend suggests that patients on novel antihypertensives may have found their treatment more manageable or better tolerated. Moderate adherence (50–79%) was slightly higher in Group A (21.8%) than Group B (12.7%), and low adherence (<50%) was reported in a small fraction of both groups, with Group B again performing better (3.6% vs. 9.1%).

Table 4: Incidence of Adverse Effects
The incidence of adverse effects was generally lower in Group B. Common side effects like dizziness and fatigue were observed in both groups without significant differences (p=0.54 and p=0.27, respectively). However, cough was significantly more frequent in Group A (10.9% vs. 1.8%, p=0.05), likely attributable to ACE inhibitors. Electrolyte imbalances were reported slightly more in Group A (7.3% vs. 3.6%) but were not statistically significant. Notably, a significantly larger proportion of patients in Group B reported no side effects at all (74.5% vs. 50.9%, p=0.01), highlighting the better tolerability profile of novel antihypertensive agents.

Table 5: Quality of Life Scores at 12 Weeks
Patients receiving novel antihypertensives (Group B) reported significantly better quality of life across all domains after 12 weeks of therapy. The mean physical health score was 74.9 ± 8.7 in Group B versus 68.2 ± 9.4 in Group A (p<0.01). Mental well-being also showed significant improvement (72.6 ± 9.2 vs. 66.5 ± 10.1, p=0.01). The overall quality of life score was significantly higher in Group B (74.2 ± 9.0) than in Group A (67.3 ± 9.7), with p<0.01. These findings suggest that improved blood pressure control, coupled with fewer side effects and better adherence, contributed to a more favorable patient-reported experience in the group receiving novel medications.

Table 1: Baseline Demographic and Clinical Characteristics of Study Participants

Parameter	Group A (Traditional, n=55)	Group B (Novel, n=55)	p-value
Mean Age (years)	56.3 ± 9.4	55.7 ± 10.1	0.72
Male (%)	32 (58.2%)	30 (54.5%)	0.70
Female (%)	23 (41.8%)	25 (45.5%)	0.70
Mean BMI (kg/m²)	27.4 ± 3.1	27.1 ± 3.5	0.64
Baseline Systolic BP (mmHg)	152.5 ± 9.2	153.1 ± 8.8	0.65
Baseline Diastolic BP (mmHg)	96.8 ± 6.4	97.3 ± 6.1	0.58

Table 2: Blood Pressure Changes Over Time (Mean ± SD)

Time Point	Group A Systolic	Group B Systolic	p-value	Group A Diastolic	Group B Diastolic	p-value
Baseline	152.5 ± 9.2	153.1 ± 8.8	0.65	96.8 ± 6.4	97.3 ± 6.1	0.58
4 Weeks	142.7 ± 8.5	138.4 ± 7.9	0.03*	91.2 ± 5.7	88.9 ± 5.3	0.04*
8 Weeks	136.5 ± 7.3	129.2 ± 7.0	<0.01*	86.3 ± 4.9	82.7 ± 4.8	<0.01*
12 Weeks	131.8 ± 6.8	122.9 ± 6.3	<0.001*	82.1 ± 4.3	77.4 ± 4.5	<0.001*

* Statistically significant (p < 0.05)

Table 3: Medication Adherence at 12 Weeks

Adherence Level	Group A (n=55)	Group B (n=55)	p-value
High (≥80%)	38 (69.1%)	46 (83.6%)	0.08
Moderate (50-79%)	12 (21.8%)	7 (12.7%)	
Low (<50%)	5 (9.1%)	2 (3.6%)	

Table 4: Incidence of Adverse Effects

Adverse Effect	Group A (n=55)	Group B (n=55)	p-value
Dizziness	7 (12.7%)	5 (9.1%)	0.54
Fatigue	10 (18.2%)	6 (10.9%)	0.27
Cough	6 (10.9%)	1 (1.8%)	0.05*
Electrolyte Imbalance	4 (7.3%)	2 (3.6%)	0.40
No Side Effects	28 (50.9%)	41 (74.5%)	0.01*

* Statistically significant (p < 0.05)

Table 5: Quality of Life Scores at 12 Weeks (Mean ± SD)

Domain	Group A	Group B	p-value
Physical Health Score	68.2 ± 9.4	74.9 ± 8.7	<0.01*
Mental Well-being Score	66.5 ± 10.1	72.6 ± 9.2	0.01*
Overall QoL Score	67.3 ± 9.7	74.2 ± 9.0	<0.01*

DISCUSSION

The baseline comparability between the two groups in terms of age, gender, BMI, and initial blood pressure suggests that the outcomes observed were likely attributable to the treatment regimens rather than pre-existing demographic or clinical differences. This balanced distribution strengthens the internal validity of the study. Similar baseline homogeneity was emphasized in the study by Neutel et al. (2005), where groups receiving different antihypertensive classes also had matched characteristics prior to intervention, ensuring a fair comparative analysis. In our study, the mean age across both groups was approximately 56 years, and BMI remained consistent (27.4 vs. 27.1 kg/m²), aligning with Neutel et al.'s findings where average ages were in the mid-50s and baseline BP across groups showed minimal variation (SBP ~150 mmHg).[8]

The more pronounced and rapid reduction in blood pressure observed in Group B using novel antihypertensive agents is consistent with findings from the VALUE trial conducted by Julius et al. (2004). In that large-scale study, ARBs were shown to produce more rapid and sustained reductions in systolic blood pressure compared to traditional therapies like calcium channel blockers and beta-blockers. Our study showed a 12-week SBP reduction to 122.9 mmHg in Group B compared to 131.8 mmHg in Group A ($p<0.001$), echoing the significant advantage observed in the VALUE trial, where patients on valsartan achieved lower BP earlier and sustained reductions over time, contributing to improved cardiovascular outcomes.[9]

Medication adherence, although not statistically significant between groups, trended higher in the group receiving novel agents. This may be attributed to fewer side effects and potentially simpler dosing regimens. Similar observations were reported by Burnier et al. (2001), who highlighted that newer antihypertensive agents often had better pharmacokinetic profiles and tolerability, leading to improved long-term compliance. In our study, 83.6% of Group B patients demonstrated high adherence, compared to 69.1% in Group A. Burnier et al. noted that even a 10–15% increase in adherence could substantially influence BP control and long-term cardiovascular risk, further supporting the clinical value of improved compliance.[10]

In terms of adverse effects, our study found that Group B reported significantly fewer side effects, with 74.5% of patients reporting none, compared to only 50.9% in Group A ($p=0.01$). This difference was most notable with the incidence of cough, which was significantly higher in Group A (10.9%)—likely due to the use of ACE inhibitors. These findings are consistent with the analysis by Israili and Hall (1992), who documented cough as a well-known adverse effect of ACE inhibitors, affecting up to 20% of patients, while newer ARBs and other novel agents showed much lower rates of such reactions. This reinforces the preference for newer agents in patients at risk of poor tolerability.[11]

Improvement in quality of life was also significantly better among patients on novel antihypertensives, with overall scores reaching 74.2 ± 9.0 in Group B versus 67.3 ± 9.7 in Group A ($p<0.01$). This finding correlates with the study by Mulrow et al. (1990), which examined the psychosocial impact of antihypertensive therapy and found that certain traditional agents, particularly beta-blockers, were associated with fatigue, sexual dysfunction, and mood changes, all of which negatively impacted patient-reported outcomes. In contrast, patients on newer agents experienced fewer such issues, translating into better physical and mental health scores.[12]

Lastly, the comprehensive benefits seen with novel antihypertensives in our study—better BP control, higher adherence, fewer side effects, and improved quality of life—mirror the conclusions drawn by Cushman et al. (2002) in the ALLHAT study. While that trial mainly focused on traditional medications, it also indirectly highlighted the limitations of older therapies in certain patient populations. Our findings provide contemporary support for the evolution toward more targeted, tolerable, and effective therapies in hypertension management, as suggested by Cushman et al., who emphasized that the choice of antihypertensive agent should be driven not only by BP-lowering efficacy but also by the patient's overall treatment experience.[13]

CONCLUSION

This study demonstrated that novel antihypertensive agents are more effective than traditional medications in achieving faster and greater reductions in both systolic and diastolic blood pressure over a 12-week period. Patients receiving novel therapies also reported higher adherence, fewer adverse effects, and significantly better quality of life scores. Although both groups started with similar baseline characteristics, the outcomes favor the newer agents in terms of both clinical efficacy and patient-centered benefits. These findings support the consideration of novel antihypertensives as a preferred option in the management of essential hypertension.

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