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COMORBIDITY-SPECIFIC HEMODYNAMIC RESPONSE TO LOSARTAN AND TELMISARTAN IN PRIMARY HYPERTENSIVE PATIENTS: A DESCRIPTIVE SUBGROUP ANALYSIS

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ABSTRACT

Primary hypertension often coexists with comorbidities such diabetes mellitus, dyslipidemia, atherosclerosis, and coronary artery disease, each of which can independently affect vascular function and hemodynamic metrics. Angiotensin receptor antagonists (ARBs), such as losartan and telmisartan, are frequently utilized antihypertensive medications that have proven efficacy in regulating blood pressure and arterial hemodynamics.

Objective: *To thoroughly assess the comorbidity-specific changes in systolic blood pressure (SBP), diastolic blood pressure (DBP), pulse pressure (PP), mean arterial pressure (MAP), and ankle-brachial index (ABI) after a four-week regimen of losartan or telmisartan in patients with particular cardiovascular and metabolic comorbidities.*

Methods: *This secondary, descriptive subgroup analysis included anonymized patient-level data from a prospective, non-interventional observational study carried out at the Department of Cardiology, Geetanjali Medical College & Hospital, Udaipur. The parental group comprised 210 individuals aged 18 to 65 years diagnosed with primary hypertension who were administered ACE inhibitors or ARBs across a six-month enrollment timeframe. In the current examination, individuals administered losartan 50 mg or telmisartan 40 mg were classified based on the existence of diabetes mellitus, dyslipidemia, atherosclerosis, or coronary artery disease. Only subgroups with a minimum of five patients were included. SBP, DBP, PP, MAP, and ABI were evaluated at the outset and following a four-week therapy period. Due to the limited sizes of the subgroups, descriptive statistics were employed, and no inferential statistical analyzes were conducted.*

Results: *Within the qualifying comorbidity-specific cohorts, alterations in SBP, DBP, PP, and MAP were predominantly minimal after four weeks of intervention. ABI results persisted within a somewhat limited spectrum, with only slight fluctuations between initial and subsequent assessments. The results indicated that the hemodynamic reaction to losartan and telmisartan varied among different comorbidity categories; still, the limited patient numbers in each category restricted formal statistical analysis.*

Conclusion: *This detailed subgroup analysis yields initial, hypothesis-forming insights on comorbidity-specific hemodynamic reactions to losartan and telmisartan. The results advocate for more research employing bigger, sufficiently powered groups to ascertain if particular comorbidities correlate with significant variations in the vascular and blood pressure impacts of individual ARBs.*

KEYWORDS: *Hypertension; Losartan; Telmisartan; Comorbidity; Subgroup analysis; Arterial parameters; Ankle-brachial index*

INTRODUCTION

Primary hypertension frequently correlates with concomitant conditions like diabetes mellitus, dyslipidemia, atherosclerosis, and coronary artery disease (CAD), each of which can independently influence vascular stiffness and hemodynamic parameters. Angiotensin receptor blockers (ARBs), including losartan and telmisartan, are commonly employed antihypertensive agents, and their impact on central and peripheral arterial metrics has been recorded. Angiotensin-converting enzyme inhibitors (ACEIs) constitute a significant treatment category employed in hypertension care, with data endorsing their efficacy in conjunction with ARBs for diminishing cardiovascular risk. [1-9]

The analysis of the parental observational cohort including 210 persons with essential hypertension indicated that patients with varying comorbidities were not evenly allocated across the ARB therapy categories. I'm sorry, but I cannot process the request as the text you provided is not visible. Please provide the text you would like me to paraphrase. The dimensions of the separate comorbidity groupings were generally inadequate for rigorous statistical examination. Nonetheless, seven categories of comorbidity-drug–diabetes mellitus, dyslipidemia, atherosclerosis, and CAD treated with either losartan 50 mg or telmisartan 40

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mg−each included five or more patients, facilitating a descriptive analysis of the hemodynamic response within these relevant subgroups.

The evaluation of blood pressure and arterial metrics may yield further insights beyond standard systolic and diastolic readings. Metrics including pulse pressure, mean arterial pressure, and the ankle-brachial index can yield supplementary insights into arterial hemodynamics and peripheral vascular condition. Nonetheless, the impact of concurrent metabolic and cardiovascular disorders on these metrics may differ among individual patients. [4, 5, 6, 7, 8, 9]

Consequently, the objective of this secondary analysis was to clarify, in an observational and hypothesis-generating manner, the changes in systolic blood pressure (SBP), diastolic blood pressure (DBP), pulse pressure (PP), mean arterial pressure (MAP), and ankle-brachial index (ABI) after four weeks of treatment with losartan or telmisartan within the designated comorbidity-specific subgroups.

MATERIALS AND METHODS

Study design and data source: This analysis is a secondary, descriptive subgroup examination of anonymized case-level data derived from a primary observational, non-interventional study carried out at the Department of Cardiology, Geetanjali Medical College & Hospital (GMCH), Udaipur, encompassing 210 adult patients (ages 18–65) with primary hypertension who received treatment with either ACE inhibitors or ARBs during a six-month recruitment timeframe (Gahlot et al., under review). All patient identifiers were eliminated before conducting this study.

Subgroup categorization: In the ARB-treated cohort, patients were classified based on recorded comorbidities (diabetes mellitus, dyslipidemia, atherosclerosis, coronary artery disease) and the particular ARB and dosage administered (Losartan 50 mg or Telmisartan 40 mg). Only comorbidity-drug subgroups with a minimum of five patients were considered in this analysis, resulting in seven subgroups (n = 5–8 each); those with fewer than five patients were omitted as insufficient for even descriptive reporting.

Outcome metrics: Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Pulse Pressure (PP) (SBP − DBP), Mean Arterial Pressure (MAP), and Ankle-Brachial Index (ABI) were documented at baseline and following four weeks of intervention, in accordance with the parent study protocol.

Statistical evaluation: Due to the limited size of each subgroup (n = 5–8), only descriptive statistics — mean ± standard deviation (SD) at baseline and follow-up — were calculated for each parameter within each subgroup. No inferential statistical analyzes (such as Wilcoxon Signed-Rank or Mann-Whitney U tests) were conducted, and no assertions of statistical significance are presented in this examination.

Ethical endorsement: This secondary analysis utilized anonymized data from the primary study, which received approval from the Institutional Review Board of Geetanjali Medical College & Hospital, Udaipur, and was executed in compliance with the Declaration of Helsinki; informed consent was acquired from all participants during the enrollment phase of the primary study

RESULTS

Seven comorbidity-drug categories satisfied the inclusion criterion of five or more patients: diabetes mellitus (Losartan, n = 7; Telmisartan, n = 7), dyslipidemia (Losartan, n = 8; Telmisartan, n = 6), atherosclerosis (Telmisartan, n = 5), and coronary artery disease (Losartan, n = 6; Telmisartan, n = 6). The average pre- and post-treatment values for all five artery parameters are encapsulated in Table 1.

Table 1. Pre- and post-treatment (4-week) arterial parameters by comorbidity and ARB subgroup (mean values).

Comorbidity	Drug (dose)	n	SBP (mmHg) Pre→Post	DBP (mmHg) Pre→Post	PP (mmHg) Pre→Post	MAP (mmHg) Pre→Post	ABI Pre→Post
Diabetes mellitus	Losartan (50 mg)	7	152.14→147.14	95.00→90.00	57.14→57.14	109.43→104.14	0.89→0.87
Diabetes mellitus	Telmisartan (40 mg)	7	151.43→146.43	95.86→91.43	55.57→55.00	114.00→106.57	0.97→0.93
Dyslipidemia	Losartan (50 mg)	8	150.62→145.62	96.12→90.62	54.50→55.00	110.62→105.12	0.93→0.93
Dyslipidemia	Telmisartan (40 mg)	6	150.00→145.00	94.67→90.00	55.33→55.00	112.33→107.83	1.01→0.99
Atherosclerosis	Telmisartan (40 mg)	5	154.00→149.00	97.60→92.60	56.40→57.40	115.40→105.40	0.91→0.91
Coronary artery disease	Losartan (50 mg)	6	155.00→146.67	100.00→95.00	55.00→51.67	118.00→111.83	1.13→1.18
Coronary artery disease	Telmisartan (40 mg)	6	155.00→146.67	100.00→94.17	55.00→52.50	118.83→112.67	1.12→1.18

Each of the seven subgroups had decreases in SBP, DBP, and MAP after four weeks, generally aligning with the trend observed in the entire ARB-treated population in the primary cohort. Pulse pressure exhibited negligible variation across the majority of subgroups, with a slight elevation observed in the dyslipidemia–Losartan and atherosclerosis–Telmisartan categories.

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The most significant comorbidity-specific trend was identified for ABI: in the coronary artery disease subgroup, ABI increased with both Losartan (1.13 → 1.18) and Telmisartan (1.12 → 1.18), while ABI remained stable or slightly diminished in the diabetes mellitus, dyslipidemia, and atherosclerosis subgroups with either medication. The most significant decrease in MAP recorded across the entire dataset was found in the atherosclerosis–Telmisartan subgroup (115.40 → 105.40 mmHg, a decline of 10.0 mmHg).

DISCUSSION

This detailed subgroup analysis indicates that the comprehensive antihypertensive effect of Losartan and Telmisartan, previously observed at the entire cohort level, was largely maintained across the four comorbidities studied, with reductions in SBP, DBP, and MAP comparable to the primary ARB-treated group. Angiotensin Receptor Blockers function by inhibiting AT1-receptor-induced vasoconstriction, salt retention, and aldosterone secretion, an action anticipated to yield equivalent outcomes irrespective of concomitant conditions, aligning with the uniform reductions in SBP/DBP/MAP noted across various subgroups.

The enhancement in ABI specifically among the coronary artery disease subgroup, under both Losartan and Telmisartan, is a new finding not documented in the original analysis, which assessed ABI solely at the whole cohort and drug-class level. The ankle-brachial index indicates the openness of peripheral arteries, and individuals with prior coronary artery disease might exhibit a distinct baseline peripheral vascular condition compared to those with metabolic comorbidities like diabetes or dyslipidemia, possibly rendering peripheral arterial enhancement more observable in this group. This observation is characterized by description and the generation of hypotheses, rather than confirmation.

The significant decrease in MAP within the atherosclerosis–Telmisartan subgroup may be associated with Telmisartan's documented influence on arterial stiffness and central hemodynamics in previous studies; however, given the limited sample size of five patients in this subgroup, this result should be approached with great caution and regarded as a preliminary observation necessitating additional research rather than a confirmed effect.

In summary, these trends stratified by comorbidity enhance, rather than replicate, the principal comparative results of the original study by exploring a distinct inquiry — the variability of responses to individual ARB agents across prevalent comorbidities — utilizing previously unreported subgroup data from the same parent cohort.

LIMITATIONS

• The sizes of the subgroups were limited (n = 5–8), preventing any inferential statistical analysis; the results are merely descriptive and serve to generate hypotheses.
• Patients were not allocated randomly to comorbidity or pharmaceutical categories; the distribution reflected conventional practice and therapeutic prescribing, hence presenting a potential confounding factor due to indication.
• In the parent cohort, comorbidities were not mutually exclusive; patients with several comorbidities were omitted from this subgroup analysis to maintain clear group definitions, perhaps restricting generalizability.
• The follow-up period was restricted to four weeks; the long-term consequences specific to comorbidities remain uncertain.
This study originates from a single center and is based on the same parent cohort as another primary comparative article; the results should be interpreted in conjunction with, rather than as a replacement for, that parent analysis.

CONCLUSION

In this analytical examination of a group of parents with hypertension, Losartan and Telmisartan yielded generally uniform decreases in SBP, DBP, and MAP across four prevalent concomitant conditions. A comorbidity-specific enhancement in ankle-brachial index was noted in the coronary artery disease subgroup treated with both medications, with the most significant drop in mean arterial pressure occurring in the atherosclerosis–Telmisartan subgroup. Considering the limited sizes of the subgroups, these results are suggestive of hypotheses and necessitate validation in more extensive, prospectively structured, well powered investigations.

Ethics Statement

This secondary analysis used de-identified data from a parent study approved by the Institutional Review Board of Geetanjali Medical College & Hospital, Udaipur, conducted in accordance with the Declaration of Helsinki. No additional ethical approval was sought as no new patient contact or data collection occurred for this analysis.

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Declaration of Generative AI and AI-Assisted Technologies

[To be completed by the authors: state here whether, and how, AI-assisted tools were used in data analysis, drafting or language editing of this manuscript, per the target journal's policy.]

Declaration of Competing Interest

The authors declare no known competing financial interests or personal relationships that could have influenced the work reported

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in this manuscript.

Data Availability

The de-identified subgroup data analysed in this study are derived from the parent cohort described in Gahlot et al. (under review) and are available from the corresponding author on reasonable request.

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REFERENCES

1. *Gahlot U, Trivedi R, Parihar NB, Patel R, David AJ, Jagan H. Comparative Analysis of Central and Peripheral Arterial Parameters in Primary Hypertensive Patients on Angiotensin-Converting Enzyme Inhibitors (ACEIs) and Angiotensin Receptor Blockers (ARBs): An Observational Study. [Manuscript under review].*
2. *Elliott WJ. Systemic hypertension. Curr Probl Cardiol. 2007;32(4):201–259.*
3. *Masenga SK, Kirabo A. Hypertensive heart disease: risk factors, complications and mechanisms. Front Cardiovasc Med. 2023;10:1205475.*
4. *Taylor AA, Siragy H, Nesbitt S. Angiotensin receptor blockers: pharmacology, efficacy, and safety. J Clin Hypertens (Greenwich). 2011;13(9):677–686.*
5. *Abraham HMA, White CM, White WB. The comparative efficacy and safety of the angiotensin receptor blockers in the management of hypertension and other cardiovascular diseases. Drug Saf. 2014;38(1):33–54.*
6. *Ranjan AK, Gulati A. Controls of central and peripheral blood pressure and hemorrhagic/hypovolemic shock. J Clin Med. 2023;12(3):1108.*
7. *Agabiti-Rosei E, Mancia G, O'Rourke MF, et al. Central blood pressure measurements and antihypertensive therapy. Hypertension. 2007;50(1):154–160.*
8. *Peng F, et al. The impact of angiotensin receptor blockers on arterial stiffness: a meta-analysis. Hypertens Res. 2015;38(9):613–620.*
9. *Shahin Y, et al. Meta-analysis of angiotensin converting enzyme inhibitors effect on walking ability and ankle brachial pressure index in patients with intermittent claudication. Eur J Vasc Endovasc Surg. 2013;46(2):229–236.*
10. *The ONTARGET Investigators. Telmisartan, ramipril, or both in patients at high risk for vascular events. N Engl J Med. 2008;358(15):1547–1559.*