ORIGINAL ARTICLE

OPEN ACCESS

Deviance from First Line Therapy for Hypertension Among Patients in a Tertiary Care Hospital in Khyber Pakhtunkhwa, Pakistan

Huzaifa Saleem[1],Muhammad Shahan shahid[2],Zia Ullah[3],Bilal Ahmar[4]
Anwar Khan Wazir[5]

[1,2,3,4,5-] *Qazi Hussain Ahmed Medical Complex Nowshera,Nowshera*

ABSTRACT

Objective: To find out the degree of deviation from standard first line therapy treatment for hypertensive patients in a tertiary care hospital in Pakistan.

Study Design: A Cross sectional study

Place and Duration of Study: This study was conducted at Qazi Hussain Ahmed Medical Complex Nowshera, KP Pakistan from 16 January 2024 to 18 June 2024

Materials and Method: Convenience sampling method was used and all patients Fulfilling the criteria were included. SPSS software was used to analyze the collected data.

Results:30 patients were enrolled, all having Secondary hypertension. 50%(n=15) were prescribed Furosemide. 16.7%(n=5) were prescribed K+ Sparing diuretics. 20%(n=6) were prescribed Angiotensin receptor blocker. 3.3%(n=1) was prescribed thiazide diuretics. 26.7%(n=8) were prescribed Beta blocker. 3.3%(n=1) was prescribed Sodium Glucose Transporter 2 inhibitor (SGLT2i). 40%(n=12) were prescribed Angiotensin converting enzyme inhibitor. 26.7(n=8) were prescribed Calcium channel blocker.

Conclusion : In 46.6% of the patients, the WHO first line therapy guidelines were followed, while in 53.3% of the patients they were not followed.

Keywords: First line therapy of Hypertension, American Heart Association Hypertension classification, Pathophysiology of hypertension.

How To Cite This Article: Saleem H, Shahid MS, Ullah Z, Ahmar B, Wazir AK. Deviance from first-line therapy for hypertension among patients in a tertiary care hospital in Khyber Pakhtunkhwa, Pakistan. **J Bacha Khan Med Coll.** 2024;5(2):**27-33.**

Correspondence Author: Anwar Khan Wazir
Department of Physiology Qazi hussain Ahmed Medical Complex ,Nowshera, Pakistan
Email:dr.anwer1970@gmail.com
https://orcid.org/0009-0002-4739- 6199

Received: 28st July, 2024
Revised: 17th September, 2024
Accepted: 09th December, 2024
Published: 1st January, 2025
DOI: https://doi.org/10.69830/jbkmc.v5i02.154

INTRODUCTION

Ischemic heart disease is the leading Myocardial infarction is the most frequent cause of death in the global population and in Pakistan it is a major health concerns. Atherosclerosis was agreed to be one of the causes and is the prevention of blood flow to the necessary organs by the thinning and calcification of arteries. When it comes to the risk factors for atherosclerosis, hypertension assumes a special significance because it is a potent risk magnifier of coronary artery disease. When hypertension is left unmanaged, endothelial function decompensates, the inflammation of the blood vessels is amplified, and the arteries harden thus prematurely promoting the development of atherosclerosis. Control of hypertension is crucial to lessen further cardiovascular morbidity and mortality and to enhance the patients' prognosis (1, 2).The treatment of hypertension is carried out in strict compliance with the guidelines created by the WHO, ACC, and NHS UK. These organizations suggest using calcium channel blockers, angiotensin receptor blockers or Angiotensin- converting enzyme inhibitors and Thiazide Diuretics as first choice pharmacological therapies. These drugs combine to reduce blood pressure, protect the organs, and remove the damaging cardiovascular risk factors of untreated-hypertension(3, 4).Hypertension is among the most common NCDs since it affects nearly one billion adults or 45 % of the adult population. This is because it has cut across all the existing category of culture, class, creed or country within any given society (5). Although hypertension is a relatively controllable condition, a considerable number of patients are either diagnosed late or receive suboptimal care mainly in LMICs including Pakistan. The condition is grouped into primary hypertension (essential hypertension) or secondary hypertension. WHO defined primary hypertension as new, raised blood pressure, no other apparently associated chronic diseases, and a blood pressure level of 140/90 mmHg or above. Secondery hypertension is hypertension in a patient with concurrent diseases like diabetes, chronic kidney disease or ischemic heart disease where systolic BP of ≥ 130 mmHg warrant pharmacological control (6,7).Consequently, the complicationsresulting from uncontrolled hypertension are terrible in the long-run. Hypertensive heart disease is a direct consequence of hypertensive cardiovascular disease and causes such impairments of the left ventricle, atrium, and heart failure due to left ventricular hypertrophy. The pathophysiology is tightly interwoven with the renin-angiotensin-aldosterone system, that is a critical modulator of blood pressure. High BP stimulates the production of Renin from the kidneys, which converts Angiotensinogen; a substance that is produced in the liver to form Angiotensin. This is then converted to angiotensin II by angiotensin converting enzyme (ACE) in the lungs. As a Renin system substrate, Ang II acts systemically to constrict blood vessels, increase sodium and water reabsorption which in turn lead to hypertrophy of the vessels and a new cycle of hypertension and cardiovascular disease (8-9).Hypertension and its complications remain a major challenge hence the need to approach the issue of hypertension detection, prevention and management with a rich strategy. In this thesis, the author aims to investigate whether hospitalized patients get optimal antihypertensive treatment and how far the case is from international guideline recommendations and what consequences inadequate control in a tertiary care setting may entail (11-13).

METHODOLOGY

Study Design and Setting

This cross-sectional study was conducted at Qazi Hussain Ahmed Medical Complex, Nowshera, Pakistan, from January 16 to June 18, 2024, in the Medical and Cardiology inpatient wards.

Study-Population

The study included patients admitted to Medical and Cardiology wards during the study period. Excluded were outpatients and pre-admission cases. Participants were selected using convenience sampling after obtaining informed consent.Only patients admitted to the Medical and Cardiology wards during this period were considered eligible. Patients from the Outpatient Department and those admitted prior to the study start date were excluded. Convenience sampling was used to select participants. After obtaining informed consent, trained data collectors recorded patient demographics, clinical features, and blood pressure values using a calibrated sphygmomanometer. Hypertension staging was based on the JNC-7 criteria, while definitions for isolated systolic and diastolic hypertension were obtained from the 2023 ACC/AHA guidelines. Data were entered and analyzed using SPSS version 25. Descriptive statistics were used for frequencies and means, while chi-square and t-tests were applied to determine statistical significance, with a p-value < 0.05 considered significant.

Inclusion Criteria

Patients aged ≥18 years admitted to Medical or Cardiology wards during the study period and meeting the WHO pharmacological threshold for hypertension treatment were included after providing informed written consent.

Exclusion Criteria

Patients from the OPD, those admitted before January 16, 2024, or those with incomplete records, chronic illness unrelated to hypertension, or not fulfilling WHO treatment criteria were excluded.

Ethical Approval Statement:

Ethical approval for this study was granted by the Institutional Review Board (IRB) under **ERB-NO-QHAMC-718-09-2019** to ensure compliance with ethical

standards and the protection of participant rights. Informed consent was obtained from all participants, assuring their understanding of the study's objectives, potential benefits, and their right to withdraw at any time. Confidentiality and privacy were maintained through anonymization and secure storage of participant data. This ethical framework ensured the integrity of the research and the well-being of participants.

RESULTS

A total of 30 patient's data was collected. Mean age was 58.17 with a standarddeviation of 12.782. 20(66.7%) were Female and 10(33.3%) were male. Systolic BP was 163.97 ±23.532 mmHg (Mean ±Standard deviation) and the Diastolic BP was 90.90 ±13.677 mmHg. Lowest systolic BP was 130 mmHg and the highest was 210 mmHg. Isolated systolic hypertension was recorded in 3 patients. Lowest diastolic BP was 50 mmHg and the highest 110mmHg. 100%(n=30) of the patient had secondary hypertension. 50%(n=15) were prescribed Furosemide. 16.7%(n=5) were prescribed K^+ Sparing diuretics. 20%(n=6) were prescribed Angiotensin receptor blocker. 3.3%(n=1) was prescribed thiazide diuretics. 26.7%(n=8) were prescribed Beta blocker. 3.3%(n=1) was prescribed SGLT2 inhibitor. 40%(n=12) were prescribed Angiotensin converting enzyme inhibitor. 26.7(n=8) were prescribed Calcium channel blocker. In n = 14(46.66%) WHO First line therapy was followed and ACE inhibitor, ARB, CCB, Thiazide were prescribed either alone or in combination. In n = 16(53.3%) other antihypertensive drugs were prescribed in combination to WHO first line drugs. These includes Furosemide (n = 15), K^+ Sparing diuretics (n = 5), SGLT2 inhibitor (n = 1).

Table 1 Hypertensive Criteria

Prehypertension	120-39 systolic and/or 80-89 mmHg diastolic
Stage 1 hypertension	140-159 systolic and/or 90-99 mmHg diastolic
Stage 2 hypertension	≥160 systolic or ≥100 mmHg diastolic
Isolated diastolic hypertension	≥90 diastolic and ≤140 mmHg systolic
Isolated systolic hypertension	≥140 systolic and ≤90 mmHg diastolic
Threshold for pharmacological treatment	Without any comorbidity ≥140/90 mmHg
Threshold for pharmacological treatment	With comorbidity Systolic ≥130-39 mmHg

Table 2 Socio demographic

Variable	Values
Total participants	n=30
Age (Mean ± SD)	58.17±12.782
Female	66.7%(n=20)
Male	33.3%(n=10)
Systolic BP range	130-210 mmHg
Diastolic BP range	50-110 mmHg
Systolic Bp (Mean ± SD)	163.97±23.532 mmHg
Diastolic Bp (Mean ± SD)	90.90±13.677 mmHg
Isolated diastolic hypertension	n=0

Isolated systolic hypertension	n=3
Primary hypertension	n=0
Secondary hypertension	**n=30**

Table 3 Antihypertensive prescription and other modalities

Variable	Frequency (n)
Drugs prescribed	
Angiotensin Converting Enzyme inhibitor	12
Angiotensin receptor blocker	6
Calcium channel blocker	8
Beta blocker	8
Thiazide diuretics	1
Furosemide	15
K^+ Sparing diuretics	5
Sodium Glucose Transporter 2 inhibitor	1
Drugs used as Monotherapy	
Angiotensin Converting Enzyme inhibitor	3
Angiotensin receptor blocker	1
Calcium channel blocker	4
Beta blocker	2
Furosemide	4
No. of drug combinations	
2	11
3	4
4	1
	1
Stages of Hypertension	
Prehypertension	4
Stage 1	6
Stage 2	20
Appropriate prescriptions	**14**

DISCUSSION

the management of hypertension in clinical practice. High blood pressure does not only rank among the leading CV and renal risk factors but also requires strict compliance with medical guidelines. In a recent systematic review by puhan, et al the authors highlighted that well implemented pharmacological and non pharmacological interventions decreases the adverse events in hypertensive patients (12). A also patient education and self-management in hypertension has also been discussed with Cochrane reviews stressing enhanced blood pressure control and patient concordance underlying to structured educational strategies (13).An important aspect of AHT control is precise categorization and stratification of the condition. The specific guidelines introduced by the seventh report of the Joint National Committee (JNC-7) included specific indications by which hypertension can be classified into different stages, which provides recommendations for the clinical approach towards the disease (14). This report also highlighted need for early management in hypertensive heart disease and reduced end-organ damage. Franklin et al. expanded on the risk factors that are strongly associated with diastolic as well as systolic hypertension, stating that early intervention on the newly identified high risk patients would assist halt progress of the disease (15).As reflected in hypertension care, the application of the global guidelines in low- and middle-income countries such as Pakistan has its set of challenges. A research articles by Gimba et al and Oyewo et al also revealed disparities in adherence to treatment and prescription of drugs in tertiary institutions ‘due to dearth of resources and lack of update professional development of the practitioners (16). This is in agreement with the findings we made in this paper where some of the patients had received treatment that did not conform to the WHO recommended standards in some instances. Medical treatment remains perhaps the most effective method of controlling hypertension. Beta-blockers, calcium channel blockers and ACE inhibitors, ARBs, and thiazide diuretics are first-lineproven therapies for hypertension in normotensive, non-black and diabetic patients as Chobanian et al. did mention in a study that was of ground for the JNC- 7 (17). These drugs do not only maintain good blood pressure control but also have cardio and renal protective benefits. However, the good outcomes of the treatment are usually hampered by patient’s compliance to use the drugs and failure to attend follow-up appointments, as pointed by Effing et al.There is also growing interest in new treatment strategies in hypertension, including emerging therapies and, personalized treatment(18). The topics of pharmacogenomics, which has been discussed by Trevor et al., are likely to form the basis for developing better approaches to the prescription of antihypertensive medication according to one’s genetic makeup (19). Additionally, as used by Buranakitjaroen in the Thailand analysis on educational audits, this revealed that it is necessary to practice routine training and audits to guarantee compliance of hypertension care (20).Last, but not the least, there is need to enhance awareness and pre-ticket with effective programmes for hypertension in the community. Another work by Ogaji et al highlighted the need for sound comprehensive care health policies as a key to enhance patient care whilst overcoming challenges that are system related in developing nations (21). Taken together these results underscore the importance of the multidimensional approach treating hypertension based on clinical practice guidelines, active patient involvement, as well as large-scale organizational and systemic changes.

CONCLUSION

Among the participants, 14 patients (46.7%) were prescribed antihypertensive treatment in accordance with WHO first-line therapy guidelines, including ACE inhibitors, ARBs, calcium channel blockers (CCBs), and thiazide diuretics, either as monotherapy or in combination. In contrast, 16 patients (53.3%) received additional antihypertensive agents in combination with WHO-recommended first-line drugs.

Conflict of Interest

The authors declare no conflict of interest.

Acknowledgements

None.

Authors Contribution

Concept & Design of Study: Huzaifa Saleem1,

Drafting: Muhammad Shahan Shahid2,

Data Analysis: Zia Ullah3, **Critical Review:** Bilal Ahmar4, Anwar Khan Wazir5

Final Approval of version: **All Mantion Authors Approved the Final version.**

REFRENCES

1. Xu L, Suman S, Sharma P, Kumar R, Singh SK, Bose N, et al. Assessment of hypertension association with arsenic exposure from food and drinking water in Bihar, India. Ecotoxicology and environmental safety. 2021;223:112572.

2. Tanenbaum J, Cebul RD, Votruba M, Einstadter D. Association Of A Regional Health Improvement Collaborative With Ambulatory Care-Sensitive Hospitalizations. Health affairs (Project Hope). 2018;37(2):266-74.

3. Wang L, Li N, Heizhati M, Li M, Yang Z, Wang Z, et al. Association of Depression with Uncontrolled Hypertension in Primary Care Setting: A Cross-Sectional Study in Less-Developed Northwest China. International journal of hypertension. 2021;2021(1):6652228.

4. Buscot MJ, Chandra RV, Maingard J, Nichols L, Blizzard L, Stirling C, et al. Association of Onset-to-Treatment Time With Discharge Destination, Mortality, and Complications Among Patients With Aneurysmal Subarachnoid Hemorrhage. JAMA Netw Open. 2022;5(1):e2144039.

5. Domínguez-Durán E, Mármol-Szombathy I, López-Urbano MJ, Palomo-Sánchez A, Alarcón-Balanza F, Palmero-Olmo E, et al. Balance disorders as potential confounders associated with an increased risk of acute cerebrovascular accidents. European archives of oto-rhino-laryngology : official journal of the European Federation of Oto-Rhino-Laryngological Societies (EUFOS) : affiliated with the German Society for Oto-Rhino-Laryngology - Head and Neck Surgery. 2021;278(10):3763-72.

6. Kaombe TM, Banda JC, Hamuza GA, Muula AS. Bivariate logistic regression model diagnostics applied to analysis of outlier cancer patients with comorbid diabetes and hypertension in Malawi. Scientific Reports. 2023;13(1):8340.

7. Mulder EG, de Haas S, Mohseni Z, Schartmann N, Abo Hasson F, Alsadah F, et al. Cardiac output and peripheral vascular resistance during normotensive and hypertensive pregnancy–a systematic review and meta-analysis. BJOG: An International Journal of Obstetrics & Gynaecology. 2022;129(5):696-707.

8. Uba MM, Jiadong R, Sohail MN, Irshad M, Yu K. Data mining process for predicting diabetes mellitus based model about other chronic diseases: a case study of the northwestern part of Nigeria. Healthcare technology letters. 2019;6(4):98-102.

9. Mulder E, Ghossein-Doha C, Crutsen J, Van Kuijk S, Thilaganathan B, Spaanderman M. Effect of pregnancy prolongation in early-onset pre-eclampsia on postpartum maternal cardiovascular, renal and metabolic function in primiparous women: an observational study. BJOG: An International Journal of Obstetrics & Gynaecology. 2021;128(1):121-9.

10. Planquette B, Sanchez O, Marsh JJ, Chiles PG, Emmerich J, Le Gal G, et al. Fibrinogen and the prediction of residual obstruction manifested after pulmonary embolism treatment. The European respiratory journal. 2018;52(5).

11. Bolen SD, Love TE, Einstadter D, Lever J, Lewis S, Persaud H, et al. Improving regional blood pressure control: a positive deviance tiered intensity approach. Journal of general internal medicine. 2021;36(6):1591-7.

12. Bolen SD, Love TE, Einstadter D, Lever J, Lewis S, Persaud H, et al. Improving Regional Blood Pressure Control: a Positive Deviance Tiered Intensity Approach. Journal of general internal medicine. 2021;36(6):1591-7.

13. Singh SK, Sharma SK, Mohanty SK, Mishra R, Porwal A, Kishan Gulati B. Inconsistency in prevalence of hypertension based on self-reports and use of standard tests: Implications for large scale surveys. SSM - population health. 2022;19:101255.

14. Shaw M, Moss L, Hawthorne C, Kinsella J, Piper I. Investigation of the Relationship Between the Burden of Raised ICP and the Length of Stay in a Neuro-Intensive Care Unit. Acta neurochirurgica Supplement. 2018;126:205-8.

15. Sánchez K, Ramírez-Cando L, Machado W, Villafuerte A, Ballaz S. Mean corpuscular haemoglobin concentration (MCHC): a new biomarker for high-altitude pulmonary edema in the Ecuadorian Andes. Sci Rep. 2022;12(1):20740.

16. Mizutani M, Sugiarto H, Bando H, Kondo I, Mock J. Positive Deviance: Frequent Blood Pressure Monitoring Among Non-hypertensive Middle-aged Women in Rural Indonesia. Acta medica Indonesiana. 2021;53(4):397-406.

17. Mizutani M, Sugiarto H, Bando H, Kondo I, Mock J. Positive Deviance: Frequent Blood Pressure Monitoring Among Non-hypertensive Middle-aged Women in Rural Indonesia. Acta medica Indonesiana. 2021;53(4):397-406.

18. Hjalmarsson C, Fu M, Zverkova Sandström T, Schaufelberger M, Ljungman C, Andersson B, et al. Risk of stroke in patients with heart failure and sinus rhythm: data from the Swedish Heart Failure Registry. ESC heart failure. 2021;8(1):85-94.

19. Kawai A, Hui S, Beare R, Srikanth VK, Sundararajan V, Ma H, et al. Spatiotemporal analysis of regional TIA trends. Front Neurol. 2022;13:983512.

20. Marbaniang SP, Chungkham HS, Lhungdim H. A structured additive modeling of diabetes and hypertension in Northeast India. PloS one. 2022;17(1):e0262560.

21. Breathett K, Kohler LN, Eaton CB, Franceschini N, Garcia L, Klein L, et al. When the at-risk do not develop heart failure: understanding positive deviance among postmenopausal African American and Hispanic women. Journal of cardiac failure. 2021;27(2):217-23.

Published by: Journal of Bacha Khan Medical College.Mardan, Pakistan