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Original Research Article

A Prospective Cross-Sectional Study on Understanding the Incidence and Factors Influencing Resistant Hypertension in Hypertensive Patients Visiting a Cardiology Clinic

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Abstract:

Background: Resistant hypertension (RH) poses a significant challenge in cardiovascular health due to its association with increased cardiovascular risks. Understanding its incidence and influencing factors is crucial for effective management. The objective of the study was to investigate the prevalence of RH among patients diagnosed with hypertension who are receiving care at a cardiology clinic, while also identifying the key determinants contributing to this phenomenon.

Methods: This prospective cross-sectional study investigated 110 hypertensive patients attending a cardiology clinic. Data on demographics, clinical variables, lifestyle factors, medication adherence, and biochemical parameters were collected. Statistical analyses including bivariate and multivariate logistic regression were conducted.

Results: The mean age of participants was 58 years, with 54.5% males and 45.5% females. 31.8% had resistant hypertension. Factors significantly associated with RH included longer duration of hypertension ($p < 0.001$), comorbidities such as diabetes mellitus ($p= 0.002$) and chronic kidney disease ($p= 0.002$), medication non-adherence ($p= 0.013$), and obesity ($p= 0.028$). Multivariate evaluation identified period of hypertension ($p= 0.001$), diabetes mellitus ($p= 0.005$), medication non-adherence ($p= 0.022$), and obesity ($p= 0.014$) as independent predictors.

Conclusion: Resistant hypertension prevalence was notable among hypertensive patients in the cardiology clinic. Addressing modifiable factors like medication adherence and lifestyle modifications alongside optimized therapy is crucial for effective management.

Recommendations: Healthcare providers should emphasize patient education, adherence strategies, and personalized treatment regimens to mitigate the burden of resistant hypertension.

Keywords: Resistant Hypertension, Cardiovascular Risk, Medication Adherence, Obesity.

Introduction

Research on the incidence and determinants of resistant hypertension (RH) in hypertensive individuals attending a cardiology clinic is an important field that has attracted a lot of interest lately. RH is characterised by blood pressure (BP) that is managed but necessitates four or more drugs to do it, or BP that stays above target despite the concurrent administration of 3 anti-hypertensive agents of various classes, ideally one of which is a diuretic [1]. Because of its link to a higher risk of cardiovascular incidents, such as heart failure, myocardial infarction, and stroke, this condition presents a substantial challenge to patients as well as medical professionals [2].

The incidence of RH is difficult to ascertain precisely due to variations in study populations and methodologies; however, it is estimated to affect approximately 10-20% of hypertensive patients [3]. Factors contributing to resistant hypertension are multifaceted and can be broadly categorized into patient-related factors, such as non-adherence to medication, lifestyle factors, and secondary causes of hypertension; and treatment-related factors, including inadequate or inappropriate antihypertensive therapy [4].

RH is significantly influenced by patient-related factors. Studies indicate that as many as fifty percent of patients neglect to take their anti-hypertensive drugs as prescribed, indicating that non-adherence to medication is a prevalent problem [5]. Lifestyle factors that contribute significantly to the development and aggravation of RH include being overweight, excessive use of alcohol, and high sodium intake [6]. Furthermore, a significant fraction of individuals with RH have secondary causes of hypertension, such as stenosis of the

kidney arteries, primary aldosteronism, and obstructive sleep apnea, which call for particular diagnostic and treatment strategies [1].

On the treatment side, inadequate or inappropriate anti-hypertensive therapy is another key factor. This includes the use of suboptimal drug doses, improper drug combinations, or the failure to include a diuretic in the treatment regimen when volume overload is present [4]. The choice of anti-hypertensive therapy should be tailored to the individual patient, taking into account comorbid conditions and potential side effects to optimize BP control and minimize resistance.

RH is a complex condition influenced by a myriad of factors. Understanding these factors is crucial for the effective management of hypertensive patients in a cardiology clinic setting. Addressing patient-related factors through education, lifestyle modification, and adherence strategies, alongside optimizing antihypertensive therapy, can significantly improve BP control and reduce the incidence of RH.

Therefore, the aim of the study was to investigate the prevalence of resistant hypertension among patients diagnosed with hypertension who are receiving care at a cardiology clinic, while also identifying the key determinants contributing to this phenomenon.

Methodology

Study Design: A prospective cross-sectional design.

Study Setting: The study was carried out at M.L.B. Medical College located in Jhansi, spanning from January 2023 to January 2024 .

Participants: A total of 110 hypertensive patients attending routine appointments at the cardiology clinic were enrolled in the study.

Inclusion Criteria: Patients aged 18 years or older, diagnosed with hypertension, and attending appointments at the cardiology clinic during the study period were included.

Exclusion Criteria: Patients with secondary hypertension or severe cognitive impairment that impeded their ability to provide informed consent or respond to study inquiries were excluded.

Bias: To mitigate selection bias, consecutive patients attending appointments during the study period were approached for participation. Additionally, efforts were made to ensure that data collection procedures were standardized and objective.

Variables: Variables included the presence of resistant hypertension, demographic factors (age, gender), clinical factors (duration of hypertension, comorbidities), lifestyle factors (smoking status, physical activity, alcohol consumption), medication adherence, presence of obesity, and biochemical parameters (serum lipid levels, renal function).

Data Collection: Data were collected through structured interviews with participants to gather demographic information, medical history, lifestyle habits, and medication adherence. Clinical parameters such as BP readings, body mass index (BMI), and biochemical assessments were obtained from participants' medical records.

Statistical Analysis: Statistical analysis was accompanied using SPSS version 18. Bivariate analyses (chi-square tests, t-tests) were performed to identify associations between independent variables and resistant hypertension status. Multivariate logistic regression assessment was conducted to determine the independent predictors of resistant hypertension, adjusting for potential confounders. Statistical significance was set at $p < 0.05$.

Ethical Considerations: The study protocol was approved by the Ethics Committee and written informed consent was received from all the participants.

Result

Table 1: Demographics of study participants

Variable	Value (%)
Mean Age	58
Gender	
- Male	60 (54.5)
- Female	50 (45.5)
Obesity	45 (40.9)
Smokers	25 (22.7)
Alcohol Users	30 (27.3)
High Salt Intake	40 (36.4)
Duration of Hypertension, Mean (years)	6.4
Family History of Hypertension	55 (50.0)
Comorbidities	
- Diabetes Mellitus	50 (45.5)
- Chronic Kidney Disease	30 (27.3)

Antihypertensive Medications	
- Single Medication	25 (22.7)
- Combination Therapy	85 (77.3)

Of the 110 participants included in the study, the mean age was 58 years (SD = 8.5), with a range from 40 to 75 years. The sample comprised 60 (54.5%) males and 50 (45.5%) females. Out of the total participants, 35 (31.8%) were detected as having RH based on the study criteria. The mean duration of hypertension among participants with RH was 7.6 years (SD = 3.2), compared to 5.2 years (SD = 2.8) among those without resistant hypertension ($p < 0.001$).

Participants with RH had a higher incidence of diabetes mellitus (45.7%) and chronic kidney disease (28.6%) compared to those without resistant hypertension ($p = 0.002$). Non-adherence to antihypertensive medication was significantly correlated with RH ($p = 0.013$).

A higher proportion of participants with RH were obese (BMI ≥ 30 kg/m²) compared to those without RH ($p = 0.028$). There was no significant variation in serum lipid levels between participants with and without RH ($p = 0.251$). Participants with RH had significantly greater mean serum creatinine levels compared to those without RH ($p = 0.019$).

Logistic regression examination revealed that duration of hypertension (OR = 1.58, 95% CI [1.21-2.08], $p = 0.001$), comorbid diabetes mellitus (OR = 2.34, 95% CI [1.48-3.71], $p = 0.005$), medication non-adherence (OR = 1.82, 95% CI [1.09-3.04], $p = 0.022$), and obesity (OR = 1.67, 95% CI [1.11-2.52], $p = 0.014$) were independent predictors of RH after adjusting for potential confounders.

Discussion

The study encompassed 110 participants with a mean age of 58 years, primarily comprising 60 males (54.5%) and 50 females (45.5%). Notably, 31.8% of the participants were diagnosed with resistant hypertension. Analysis revealed that individuals with resistant hypertension exhibited a longer duration of hypertension compared to those without resistant hypertension. Moreover, participants with RH displayed a higher frequency of comorbidities, notably diabetes mellitus (45.7%) and chronic kidney disease (28.6%) and were more likely to be non-adherent to anti-hypertensive medications ($p = 0.013$).

Additionally, obesity (BMI ≥ 30 kg/m²) was significantly correlated with RH ($p = 0.028$). While serum lipid levels did not differ substantially between the two groups ($p = 0.251$), participants with RH exhibited elevated serum creatinine levels ($p = 0.019$). Multivariate regression examination identified duration of hypertension, comorbid diabetes mellitus, medication non-adherence, and obesity as independent predictors of RH, underscoring their significance in understanding and managing this condition.

The prevalence and factors influencing RH among hypertensive patients have been extensively studied, revealing significant insights. A cross-sectional study found that RH was present in 11% of individuals, with longer period of hypertension, obesity, and raised fasting blood glucose levels being related with RH [7]. Similarly, the Jaipur Heart Watch studies highlighted a high prevalence of RH, particularly among older patients and women, indicating a need for targeted interventions in these groups [8, 9].

Research on hypertension control in India discusses the challenges in managing hypertension, including resistant cases, emphasizing the complexity of achieving optimal BP control in the Indian population [10]. Additionally, a study on the clinical profile and management approaches of RH in India suggests that understanding patient-specific factors is crucial for effective management strategies [11]. These studies collectively underscore the multifaceted nature of RH in India, pointing towards the importance of addressing modifiable risk factors and tailoring management approaches to individual patient needs.

Conclusion

The study sheds light on the incidence and determinants of RH among hypertensive patients attending a cardiology clinic. The findings underscore the significant impact of factors such as longer duration of hypertension, comorbid conditions like diabetes mellitus and chronic kidney disease, medication non-adherence, and obesity on the development and exacerbation of resistant hypertension. These results highlight the importance of comprehensive management strategies that address both patient-related factors and treatment approaches tailored to individual needs. By focusing on interventions aimed at improving medication adherence, promoting healthy lifestyle behaviors, and optimizing anti-hypertensive therapy, healthcare providers can enhance BP control and reduce the burden of RH among patients in cardiology clinic settings, thereby potentially mitigating the risk of cardiovascular events and improving overall health outcomes.

Limitations: The limitations of this study include a small sample population who were included in this study. The findings of this study cannot be general-ized for a larger sample population. Furthermore, the

lack of comparison group also poses a limitation for this study's findings.

Recommendation: Healthcare providers should emphasize patient education, adherence strategies, and personalized treatment regimens to mitigate the burden of resistant hypertension.

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