

Prevalence and Risk Factors of Resistant Hypertension Among Patients Attending General Medicine OPD: A Cross-Sectional Observational Study**Nilashish Dey****Senior Resident, DrNB (resident), Department of Cardiology, Fortis Escorts, Heart Institute, New Delhi, India****Received: 02-06-2025 / Revised: 20-07-2025 / Accepted: 27-08-2025****Corresponding Author: Dr. Nilashish Dey****Conflict of interest: Nil****Abstract:****Background:** Resistant hypertension is a major clinical challenge, and it is linked to a high cardiovascular risk. Although there is a guideline-based therapy, not all patients can reach the maximum levels of blood pressure control, which is often explained by metabolic, lifestyle, or adherence-related factors.**Objective:** To establish the prevalence and risk factors of resistant hypertension in patients visiting the General Medicine OPD of a tertiary care hospital.**Methodology:** The study was a cross-sectional observation based on 180 hypertensive adults in a hospital. The structured proforma was used to record demographic information, lifestyle, comorbidities, treatment, and medication compliance. Standardized methods were used in measuring blood pressure, resistant hypertension was defined as the uncontrolled BP in the presence of 3 or more antihypertensive drugs, including a diuretic. The statistical analysis was done using SPSS.**Findings:** Resistant hypertension was common (17.8% or 32/180). The prevalence rates of diabetes mellitus (71.9%), obesity (68.8%), disordered sleep (53.1%), dyslipidemia (56.2%), and non-adherence to therapy (43.8%) were much higher in the resistant cases than in non-resistant patients. There were slight differences in smoking and drinking alcohol.**Conclusion:** Resistant hypertension is a serious condition that impacts close to a fifth of patients with hypertension and it is closely linked with metabolic abnormality, sleeping disorders, and poor adherence to medication. To enhance the BP regulation and prevent complications, early diagnosis and specific actions are required.**Keywords:** Resistant hypertension, prevalence, risk factors, diabetes, obesity, medication adherence, sleep disorder, cross-sectional study.

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Introduction

Hypertension has been among the greatest contributors to the burden of morbidity and death in the world with a significant percentage of cardiovascular, stroke and renal related issues. Although there are a variety of effective antihypertensive drugs and established guidelines on the use of these drugs, there is still a significant portion of hypertensive patients who have uncontrolled blood pressure [1]. Among them, resistant hypertension has become a unique and clinically difficult phenomenon with an increased risk of adverse cardiovascular events and increased healthcare expenses. The fact that the treatment with three or more antihypertensive agents does not improve the condition means that the stage is more developed, and, accordingly, the risk of cardiovascular events is more than 4-fold higher than among patients who can achieve the goals of managing blood pressure successfully [2] defines resistant hypertension. According to significant instructions, the Joint National Committee determines

resistant hypertension to be the failure to reach target blood pressure in the case of taking a complete dosage of three suitable medications, including diuretics. Similarly, the European Society of Hypertension defines it as hypertension that cannot be controlled with lifestyle changes, and it needs at least three drugs, including a diuretic, in order to achieve the required blood pressure levels. These definitions are acceptable and have to be understood throughout the clinical urgency of treatment with the understanding that a patient with more severe baseline hypertension needs more timely and aggressive interventions to avoid and impede organ damages and complications in the long run [3].

The correct diagnosis of resistant hypertension requires proper evaluation so as to rule out the influences that can resemble resistant treatment. The failure to take antihypertensive medication is a frequent and poorly understood factor in uncontrolled

hypertension, which leads to mis-diagnosis as well as the subsequent increase of treatment. On the same note, the white coat effect which is the higher blood pressure measurements in a clinical setting that normalizes when out of a clinical setting needs to be eliminated; this is usually achieved by the use of ambulatory blood pressure measurements or using validated home measurements. True resistant hypertension is an appealing high-risk phenotype when these considerations are considered and have been linked to adverse cardiovascular events that comprise left ventricular hypertrophy, chronic kidney disease, myocardial infarction, and stroke. In addition, patients with resistant hypertension are reported to have a much higher all-cause mortality than patients whose blood pressure is well managed on the same therapeutic regimens [4].

Lifestyle issues are an essential part of resistant hypertension development and progression. Poor lifestyle habits such as high sodium intakes, sedentary lifestyles, obesity, alcohol abuse and poor dietary habits contribute to the worsening of blood pressure and decreased sensitivity to pharmacological treatment. There is some evidence that formal lifestyle changes, including weight reduction, dietary sodium limitations, physical exercise and enhancement in sleep quality can significantly lower the chance of cardiovascular risk even in persons with resistant hypertension. However, due to the complicated pathophysiology of this condition, lifestyle interventions are not always enough, and specific pharmacological interventions are required to offer the best control [5].

Aldosterone excess is one of the most visible pathophysiological processes involved in resistant hypertension that is commonly due to primary aldosteronism or other causes of mineralocorticoid hyperactivity. This hormonal disturbance adds to the water retention, vascular constriction, and inhibition of natriuresis, which leads to the chronic increase in blood pressure. The introduction of mineralocorticoid receptor antagonists, including spironolactone or, as an alternative, amiloride, proved to have a significant effect in reducing blood pressure in patients with resistant hypertension, especially in their combination with a usual triple-medication scheme. These results highlight the significance of considering the aldosterone-mediated mechanisms and determining the pharmacological therapy based on them [6].

Compared to resistant hypertension, refractory hypertension is an even more intractable form of treatment-resistant disease, which is the loss of blood pressure control despite taking five or more antihypertensives of different classes, including long-acting thiazide-like diuretic and an interloctrix receptor antagonist, at full or hopefully optimal doses. It is reported that fluid retention and aldosterone hyperactivity are prevalent in resistant hypertension, but

refractory hypertension patients are usually characterized by an increased sympathetic nervous system activity, which leads to the continued increase in blood pressure despite multidrug treatment. This difference shows the heterogeneity of treatment-resistant blood pressure disorders and the necessity of the individual evaluation and treatment approach [7].

Low- and middle-income nations, such as India, face the brunt of resistant hypertension, and currently, the interaction between rapid epidemiological shifts, the growing popularity of risk factors related to lifestyle, and the suboptimal use of medication all contribute to the rise in the uncontrolled hypertension rates. General medicine outpatient departments (OPDs) face a high percentage of patients with hypertension, of whom most do not show up with a disease that has been well controlled. Knowledge about the rates of resistant hypertension and the key risk factors of this condition in these environments can help to advance the hypertension management strategies, raise the effectiveness of treatment plans, and avoid the development of complications.

Even though there is increasing evidence on the topic globally, there is a paucity of data on the prevalence and determinants of resistant hypertension in Indian outpatient settings. The differences in socioeconomic status, dietary habits, healthcare accessibility, medication affordability, and level of awareness further impact on the treatment outcomes. The process of early detection and management of those who belong to the high-risk category can be facilitated by identifying modifiable and non-modifiable risk factors, such as age, sex, obesity, dyslipidemia, diabetes mellitus, chronic kidney disease, medication adherence, and lifestyle behaviors. This knowledge would be important in informing clinical decision-making particularly under resource constrained settings where unwarranted or untimely treatment escalation could lead to the burdensome load on the patient without any significant reduction in blood pressure.

In the light of such considerations, there exists an urgent necessity to produce strong, context-dependent evidence on resistant hypertension among outpatient populations based in hospitals. Knowledge of local patterns of prevalence and risk profiles may also be used to establish national hypertension control initiatives and contribute to designing of individual clinical pathways. Therefore, the current research was designed to determine the prevalence and risk factors profile of resistant hypertension in hypertensive patients who visited the General Medicine outpatient unit of a tertiary care hospital. This research study will add to the current body of knowledge and aid in better clinical management interventions to deal with this problematic subgroup of hypertensive patients.

Methodology

Study Design: The study was a cross-sectional observational study based in a hospital location to establish the prevalence and risk factors of resistant hypertension among the patients who are visiting the General Medicine Outpatient Department (OPD).

Study Area: The research was conducted in the Department of Cardiology, Fortis Escorts Heart Institute, New Delhi, India.

Study Duration: The study was conducted over a period of from January 2023 to December 2023

Sample Size: A total of 180 patients were enrolled in the study.

Study Population: The population under study was the adult patients diagnosed with hypertension but attended the General Medicine OPD within the period of study.

Inclusion Criteria

- Adults aged ≥ 18 years.
- Patients previously diagnosed with hypertension and currently receiving antihypertensive therapy.
- Patients willing to provide informed consent.

Exclusion Criteria

- Pregnant women.
- Patients with incomplete medical records.
- Individuals unable to undergo blood pressure measurement (e.g., arm deformities, severe tremors).
- Patients with hypertensive emergencies or acute medical conditions requiring immediate intervention.

Data Collection: A structured proforma was used to gather the data and included questions aimed at getting demographic data as age, sex and occupation and lifestyle factors such as smoking status, alcohol consumption, dietary habits, and physical activity levels. The history of hypertension treatment, the time of hypertension development, and the family history of hypertension were documented. Signs that were suggestive of secondary hypertension were measured using both clinical assessment and recorded history. The comorbid conditions of diabetes mellitus, ischemic heart disease (IHD), chronic kidney disease (CKD), dyslipidemia, and thyroid

disorders were verified based on the past medical history of the patients. Blood pressure and compliance measurements were conducted according to the standardized protocols in order to guarantee accuracy and reliability of data. All the information that was gathered was inputted in a Microsoft excel sheet to be evaluated more thoroughly.

Procedure: The identification of eligible patients in the normal OPD visits was done, and informed consent taken up in the process. The procedure of measuring blood pressure involved a mercury sphygmomanometer used in standard precautions. Both arm readings were done when the patient was standing and to check whether he had orthostatic hypotension. Then after some short time, another test of blood pressure was carried out in the arm that had registered high measure first and this second test was counted as the final blood pressure measure. The Morisky Green Levine Adherence Scale was used to assess medication adherence with a score of 3 and above being a sign of non-adherence to the therapy. Resistant hypertension was defined based on standard definitions, where controlled resistant hypertension was blood pressure of less than 130/80 mmHg on over three antihypertensives, including a diuretic, at full or maximally tolerated doses. In order to achieve consistency within the study, all procedural steps were applied in a similar study.

Statistical Analysis: The information that was keyed into Microsoft Excel was exported into the SPSS software to be subjected to statistical analysis. Demographic and clinical variables were summarized by use of descriptive statistics. The Chi-square test was used to test the relationship between resistant hypertension and possible risk factors with the p-value of below 0.05 deemed statistically significant. An ideal study of analysis was done through the use of normal statistical procedures ensuring the findings are accurate and valid.”

“Result

Table 1 demonstrates that out of 180 hypertensive patients, resistant hypertension was found in 17.8% (32 patients), with the rest, 82.2% (148 patients) having non-resistant hypertension, which means that almost one-fifth of the study population was challenging to manage the blood pressure with the standard therapy.

Variable	Number	Percentage (%)
Non-resistant hypertension	148	82.20%
Resistant hypertension	32	17.80%
Total	180	100%

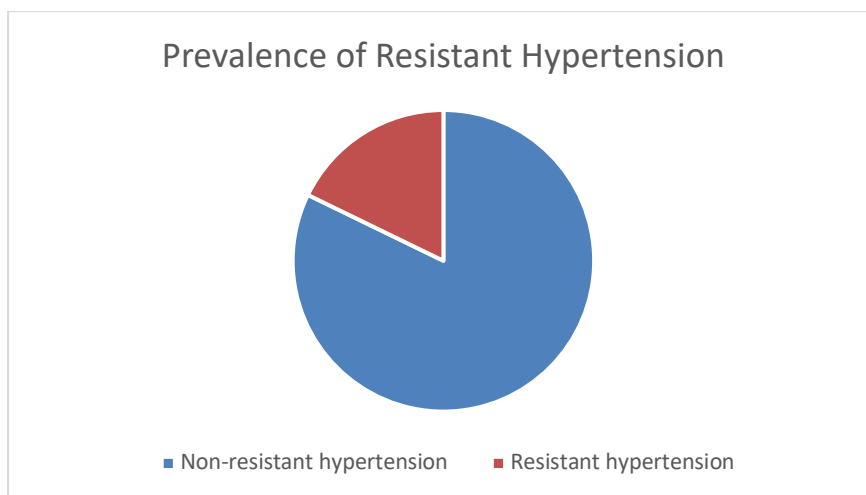


Figure 1: Prevalence of Resistant Hypertension

Table 2 indicates the existence of a strong relationship between a number of clinical risk factors and resistant hypertension. Among patients with resistant hypertension, diabetes mellitus was found in 71.9% and obesity was found in 68.8%, whereas obesity was found in 26.4% of the non-resistant group. Disordered sleep was observed in 53.1% of resistant cases, which is considerably higher than the 15.5% of non-resistant people. There were a little more

prevalent dyslipidemia in resistant hypertension (56.2% vs. 48.6%). There were only moderate differences in such lifestyle factors as smoking (34.4% vs. 32.4%) and alcohol consumption (40.6% vs. 38.5%). The likelihood of not adhering to antihypertensive therapy had been almost twice in resistant cases (Morisky ≥ 3) (43.8 vs 22.3 percent), which reinforces its role in the high level of non-compliance in regard to managing blood pressure.

Table 2: Risk Factors Associated with Resistant Hypertension

Variable	Non-Resistant HTN (n = 148)	%	Resistant HTN (n = 32)	%
Diabetes mellitus	39	26.40%	23	71.90%
Obesity	32	21.60%	22	68.80%
Disordered sleep	23	15.50%	17	53.10%
Dyslipidemia	72	48.60%	18	56.20%
Smoking	48	32.40%	11	34.40%
Alcohol consumption	57	38.50%	13	40.60%
Non-adherence (Morisky ≥ 3)	33	22.30%	14	43.80%

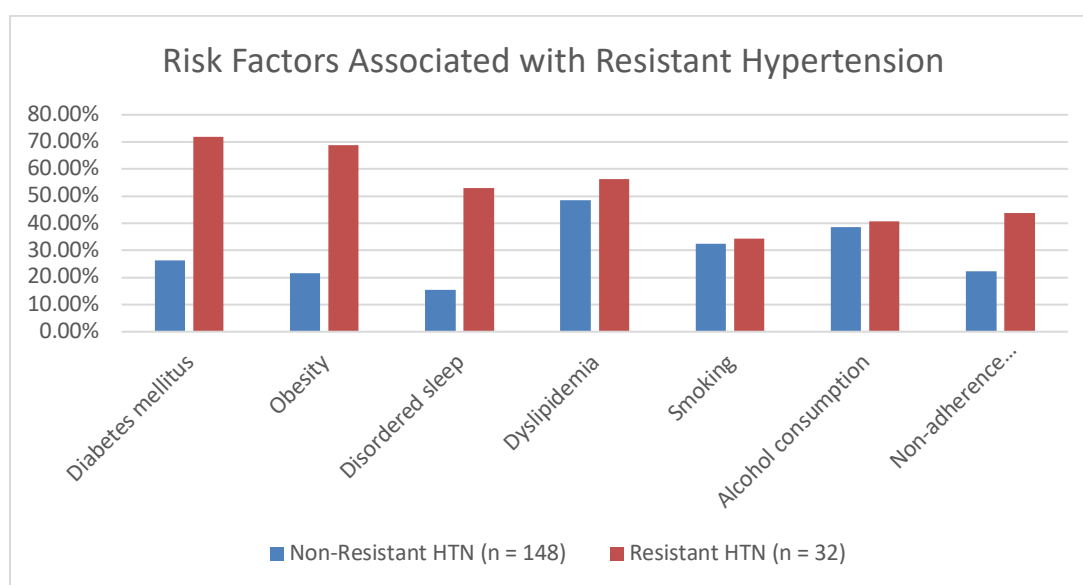


Figure 2: Risk Factors Associated with Resistant Hypertension

Discussion

The current research determined that 17.8% of hypertensive patients already qualified as resistant hypertension, which is more or less similar with the number of previous studies but varied among groups of people. A prevalence of 11% was reported by Mahapatra et al. (2021) [8] in a South Indian cohort, and a somewhat higher prevalence was reported by Kumara et al. (2013) [9] in a cohort consisting of South Asian patients, which indicates that geographic, clinical, and methodological differences can affect the burden of resistant hypertension measured. On the same note, Naseem et al. (2017) [10] recorded prevalence of 12 percent in an Asian population. Our finding of 17.8% is within this range of restrictions and supports the awareness that resistant hypertension is a significant minority of hypertensive patients, which should be given additional healthcare attention.”

When considering the risk factor distribution, our results showed that there is a considerable clustering of the metabolic abnormalities in resistant hypertensive patients. Almost three-quarters of this group were found to have diabetes mellitus, which is a contrast to slightly more than a quarter of patients with non-resistant hypertension. This contrast is in line with the case of Kumara et al. (2013) [9], who found that diabetes has become an important predictor of resistant hypertension and that the incidence of diabetes among resistant patients is greater as compared to non-resistant patients. Similarly, Mahapatra et al. (2021) [8] observed high levels of fasting blood glucose and diabetes to be highly linked to resistant hypertension, which supports the key role of metabolic dysfunction in perpetuation of the disease. The strength of our association seems to be even greater implying that diabetes could be an even stronger predictor of resistant hypertension in our clinical population than reported previously in the cohort studies.

Another strong determinant in our sample was obesity which had impact on more than two-thirds of resistant hypertensive patients, yet one-fifth of non-resistant ones. It is a trend in line with past literature. According to Mahapatra et al. (2021) [8], 77 percent of their sample consisted of overweight or obese individuals and that obesity had a significant level of correlation with treatment resistance. Equally, Obesity was an independent predictor and Kumara et al. (2013) [9] found a significantly larger prevalence of obesity among resistant patients. The proportions vary across the research; however, the common tendency is the same: obesity significantly increases the risk of developing resistant hypertension. The greater difference observed in our results demonstrates the role of excess adiposity in hemodynamic and neurohormonal changes, eventually leading to worsening anti-hypertensive responsiveness.

In our study, sleep disturbances were found in slightly more than half of the resistant hypertension population but were only found in a minority of non-resistant population. Even though this variable has not been systematically assessed in the studies mentioned, our results are in line with the growing evidence on the association of poor sleep quality, especially obstructive sleep apnea, with resistant hypertension. Although other researchers, including Naseem et al. (2017) [10], were looking more at metabolic and behavioral variables, our findings indicate the significant value of including sleep-related disorders in the risk profile owing to the well-established capacity to increase the activity of the sympathetic nervous system and nocturnal dipping of blood pressure.

Dyslipidemia was not very uncommon in both resistant and non-resistant populations but has displayed a moderately high prevalence in resistant hypertensive patients. This is in line with Naseem et al. (2017) [10], who found that there were no significant differences in hyperlipidemia between groups, indicating the possibility that dyslipidemia is not a distinguishing variable but rather a coexisting cardiovascular risk factor. However, its high rate in resistant cases in our sample can be indicative of wider metabolic impairment with an indirect effect on poor blood pressure control.

Factors of behavior and treatment also had significant roles. The non-adherence to antihypertensive medicine, evaluated by the Morisky scale, was almost twice in resistant hypertensive patients relative to non-resistant individuals. The results are supported by the study conducted by Naseem et al. (2017) [10], who found nonadherence to dietary policies and taking medications to be important factors leading to resistance. The findings support our view that visible apparent treatment resistance may embody factors of pseudo-resistance, and it has been shown that poor adherence is a significant factor. The treatment of adherence behaviours could therefore be found to provide significant benefits in blood pressure management prior to more invasive or pharmacologically aggressive measures being taken.

Lifestyle factors including smoking and alcohol drinking were relatively less different but significantly different between groups in our study. Although the prevalence of both habits was slightly higher in resistant hypertensive patients, the strong associations with resistant hypertension have not always been reported, as shown by the previous studies. The small variations in our results imply that these behaviors can act as contributing factors to the general cardiovascular risk but may not be incidentally significant in the treatment resistance as compared with the metabolic and adherence-related factors.

Altogether, the results of our research resonate and build on previous studies showing a vivid cluster of risk factors mainly diabetes, obesity, long-duration hypertensive, and non-adherence that define resistant and non-resistant hypertensive patients. Our findings also emphasize the role of thorough clinical evaluation including metabolic evaluation, behavioral counseling and maximization of anti-hypertensive therapy. The high correspondence with the existing literature serves as a measure of the external validity of our observations, whereas the greater differences in some of the variables, including diabetes and obesity, could represent a demographic/environmental specificity of our population.

Conclusion

The paper shows that resistant hypertension is a significant group of patients who present to the general medicine outpatient department and that it is closely associated with a set of both modifiable and non-modifiable factors. The greater burden of metabolic and lifestyle related factors- especially, glucose regulation abnormalities, excess body weight, sleep-related problems, and lipid abnormalities- and behavioral factors, including tobacco and alcohol consumption and poor adherence to antihypertensive medication were found in people with resistant hypertension. These results emphasize the complexity of treatment non-adherence and indicate the necessity of the multifactorial approach that is not limited to routine blood pressure control. The findings demonstrate the importance of identifying high-risk individuals early, individualized treatment approaches, and tailored interventions based on metabolic control, weight management, sleep hygiene, lifestyle changes, and adherence to medication as effective methods of enhancing blood pressure outcomes and preventing the escalation and the complications of resistant hypertension.

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