# PREVALENCE OF RESISTANT HYPERTENSION PATIENTS IN TERTIARY CARE HOSPITAL

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**ABSTRACT:**

BACKGROUND: Hypertension is highly prevalent in India but frequency of resistant hypertension has not been well studied. These patients are prone to high risk of hypertensive complications. The objective of our study was to evaluate the prevalence of resistant hypertension patients among the hypertensive population.

METHODS: The study was carried out among the hypertensive patients in tertiary care hospital in India. Patient data, characteristics and class of drugs taking was recorded using a pre-coded questionnaire. Morisky questionnaire were used to assess the self medication adherence. Chi-square test for association was used to analyse the statistical difference between the hypertensive and resistant hypertension patients and related variables.

RESULT: A total of 200 patients were included in the study, In the 35%  (n=70) of patients have essential hypertension and 65% (n=130) of patients have resistant hypertension. Resistant hypertension was more significantly associated with patients ≥40 years of age , who are all have normal BMI, not doing their physical activity, non compliant to recommended diet and not taking their antihypertensive medication regularly. Prevalence of comorbid condition, including diabetes mellitus (p=0.000), hyperlipidemia (p=0.000), cardiovascular disease(p=0.000),chronic kidney disease (p=0.003) was statistically significant between the hypertensive and resistant hypertension patients. Only 3% patients (n=4) have high medical adherence.

CONCLUSION: Resistant hypertension is a prevalent clinical condition, and its prevalence is on the rise (n=130, 65%). With our ageing (≥40 years), normal BMI population, lack of physical activity,  personal habits (smoking,alcohol), noncompliance with recommended diets, lack of physical activity, and failure to take antihypertensive medication on a regular basis, the associated increasing incidence of diabetes, hyperlipidemia, coronary artery disease and chronic kidney disease, resistant hypertension will be even more prevalent.

**KEYWORDS:** Adherence, Co-Morbities, Hypertension, Medications, Resistant Hypertension**,**

**INTRODUCTION:**

Hypertension is the world's leading risk factor for cardiovascular disease, cerebral vascular disease and renal disease. one in every three adults in India has hypertension[1]. One in five patients with hypertension in India have resistant hypertension[2]. Hypertension is typically defined as systolic blood pressure of 140 mm Hg or higher diastolic blood pressure of 90mmHg or higher. Normal or optimal blood pressure is 120/80 mm Hg[3]. The relationship between level of blood pressure and risk for cardiovascular events is linear and continuous the higher the blood pressure, the greater the chance of events. The risk of developing heart failure is two to three times higher with hypertension, which precedes the development of heart failure in 91% of cases. Blood pressures higher than 140/90 mm Hg are found in about 74% of people with heart failure, 69% of those having a first heart attack, and 77% of those having a first stroke [4].

**RESISTANT HYPERTENSION:**

Resistant Hypertension is defined as the Blood Pressure of a hypertensive patient that remains elevated above goal despite the concurrent use of 3 antihypertensive agents of differentclasses [5], commonly prescribed drugs are calcium channel blocker (CCB), beta blockers,  renin-angiotensin system angiotensin converting enzyme [ACE] inhibitor and angiotensin receptor blocker [ARB], and a diuretic.

**MEDICATION ADHERENCE:**

Adherence to antihypertensive medication of patients was assessed using morisky questionnaire. The morisky medication adherence scale otherwise known as morisky scale has proved to be valuable resource to address

adherence concerns [6], if a patients scores 0 on the scale they are evaluated as high adherence. If they score 1-2 on the scale they said to be medium adherence, if patients score ≤2 on the scale they evaluated as poor adherence.

**AIM:**
To study the prevalence of Resistant Hypertension in patients of Tertiary care Hospital.
**OBJECTIVE:**
 To assess the prevalence of resistant hypertension patients among hypertensive population

**MATERIALS AND METHODS**

A total of 200 Hypertensive patients  were selected; all patients visiting the hospital on a given day were interviewed.  From each patient, we obtained information on socio-demographic details, duration of hypertension, current medications, co-morbid conditions, lifestyle and family history of hypertension. Chi-square test for association was used to analyze the statistical difference between the hypertensive and resistant hypertension patients and related variables. Morisky questionnaire was utilized to assess adherence to antihypertensive medications, the results of which were classified into high, average and poor adherence.  The study was performed after getting approval from institutional ethical in Dr.M.G.R Educational and Research Institute .We approach the patient and interviewed after getting a written informed consent.
**SOURCES:**  Not Appilicable

**STUDY TYPE:**  Questionnaire study (Prospective observational study)
**SAMPLE SIZE:** 200 hypertensive patients
**PERIOD OF STUDY:** 6 months

**INCLUSION CRITERIA:**
- Patient diagnosed with essential hypertension and on antihypertensive drug for ≥ 1 year
- Age above 18years
- Patients of either sex

**EXCLUSION CRITERIA**:
- Below 18 years
- Secondary causes of hypertension Pregnancy
- Use of Hormonal Contraceptives
- Patient not willing for participate in study

**RESULTS:**
In our study, 130 patients taking three class of drugs considered as resistant hypertensive (p=0.001), Baseline characteristics of patients shown in Table 1. Resistant hypertension was more significantly associated in patients ≥40Yrs. 12.3% of resistant hypertension (N=16) patients have family history of hypertension.62.3% of resistant hypertension patients were non compliant to the dietary recommendations (p=0.000). Diabetes mellitus (p=0.000), hyperlipidemia (p=0.000), cardiovascular disease(p=0.000),chronic kidney disease (p=0.003) was statistically significant between the hypertension and resistant hypertension patients. 98.4% of resistant hypertensive (P=0.525) patients not doing their physical activity have higher rate of resistant hypertension. In resistant hypertension patients 3% smokers (p=0.001), 30% both (p=0.001), 3.84% are alcoholic(p=0.001).Morisky medication adherence, 3% patients (N=4,p=0.744)  have high medical adherence, 56.9% (n=72,p=0.744) of patients were poor medication adherence and 40% (n=52,p=0.744)have medium medication adherence.  Resistant hypertension was more significantly associated with patients ≥40 years of age, who are all have normal BMI, not doing their physical activity, non compliant to recommended diet and not taking their anti-hypertensive medication regularly, Only 3% (p=0.744) of patients were aware about taking antihypertensive drugs, this leads to higher risk of severing the condition into the next stage.Characteristic comparison between resistant hypertension and essential hypertension patients shown in Table 2

**TABLE 1:** **Baseline characteristics of patients**

| CHARACTERISTICS | |
|---|---|
| Male n (%) | 71 (35.5) |
| Female n (%) | 129 (64.5) |
| Age n (%) | |
| 20-39 | 27 (13.5) |
| 40-59 | 91 (45.5) |
| 60-79 | 78 (39.0) |
| 80-89 | 4 (2.0) |
| BMI n (%) | |
| Under weight | 9 (4.5) |
| Normal | 95 (47.5) |
| Pre-obesity | 70 (35.0) |
| Class 1 obesity | 17 (8.5) |
| Class 2 obesity | 6 (3.0) |
| Class 3 obesity | 3 (1.5) |
| Type of Diet n (%) | |
| Both | 190 (95.0) |
| Vegetarian | 10 (5.0) |
| Occupation n (%) | |
| Business | 14 (7.0) |
| Daily wages | 17 (8.5) |
| House wife | 98 (49.0) |
| Monthly wages | 51 (25.5) |
| Retired | 8 (4) |
| Tailor | 12 (6) |
| Family history of hypertensionn (%) [a] | 42 (21.0) |

| Life style risk factors n (%) | |
|---|---|
| Dietary non-compliance [b] | 142 (71.0) |
| Smoking | 4 (2.0) |
| Alcohol | 12 (6.0_ |
| Physical activityn (%) [c] | 196 (98.0) |
| Co-morbidities n (%) | |
| Diabetic mellitus | 165 (82.5) |
| Hyperlipidemia | 66 (33.0) |
| Chronic kidney disease | 29 (14.5) |
| Coronary artery disease | 44 (22.0) |
| Class of drugs n (%) | |
| One class | 38 (19.0) |
| Two class | 32 (16.0) |
| Three class | 130(65) |
| Drugs n (%) | |
| Angiotensin receptor blockers | 69 (34.5) |
| Angiotensin converting enzyme blockers | 93 (46.5) |
| Beta blockers | 91 (45.5) |
| Diuretics | 86 (43.0) |
| Calcium channel blockers | 153 (76.5) |
| Nitroglycerin | 3 (1.5) |
| Medication Adherencen (%) [d] | |
| High | 5 (2.5) |
| Medium | 79 (39.5) |
| Poor | 116 (58.0) |

[a] patients with positive family history for hypertension
[b] patients who are not compliant to dietary recommendations
[c] patients who are not doing their physical activity
[d] adherence to prescribed antihypertensive drugs

**TABLE: 2**

**Characteristic comparison between patients with resistant hypertension and essential hypertension**

| | Essential hypertension | Resistant hypertension | p- value |
|---|---|---|---|
| Age n (%) ≥ 40Yrs | 62(88.5) | 111(85.3) | |
| BMI n(%) Normal BMI | 95(47.5) | 64(49.2) | 0.309 |
| Family history of hypertensionn (%) [a] | 27 (38.5) | 16(12.3) | 0.000 |
| Dietary non -compliance n (%) [b] | 9(12.8) | 49(37.6) | 0.000 |
| Co-morbidities n(%) | | | |
| Diabetic mellitus | 45 (64.2) | 120(92.3) | 0.000 |
| Hyperlipidemia | 11 (15.7) | 55(42.3) | 0.000 |
| Chronic kidney disease | 3 (4.2) | 26(20) | 0.000 |
| Coronary artery disease | 5(7.1) | 39(30) | 0.000 |
| Physical activity n (%) [c] | 2(1.5) | 2(1.5) | 0.525 |
| Class of drugs n (%) | | | |
| One class | 38(54.2) | - | 0.000 |
| Two class | 32(45.7) | - | 0.000 |
| Three class | - | 130(100) | 0.000 |
| Medication Adherence n (%)[d] | | | |
| High | 1 (1.4) | 4(3.0) | 0.744 |
| Medium | 27 (38.5) | 52(40) | 0.744 |
| Poor | 42 (60) | 74(56.9) | 0.744 |

[a] patients with positive family history for hypertension
[b] patients who are not compliant to dietary recommendations
[c] p-value<0.005 were statistically significant

**DISCUSSION:**

Hypertension is the most important risk factor for cardiovascular, cerebrovascular, renal morbidity and mortality. This study was conducted to estimate the prevalence of resistant hypertension in tertiary care hospital.

The socio demographic variables collected were age, gender, body mass index, type of diet, dietary non-compliance, occupation, family history, personal habits, physical activity, comorbidities, class of drug taken by the patients and adherence of medication taking was assessed using morisky questionaries. All results for the variables yield using chi-square tests for association.

According to gender, 35.5% of hypertensive patients are male (n=71), 64.5% of hypertensive patients are female (n=129,) in that 62.3% of females (n= 81) and 37.6 % of males (n=49) have resistant hypertension. In age wise distribution, 13.5% of hypertensive patients (n=27) were from the age group of 20-39Yrs, 45.5% of hypertensive patients (n=91) comes under age group of 40-59Yrs, 39% of hypertensive patients (n=78) are in the age group of 60-79Yrs, 2% of hypertensive patients (n=4) are in the age group of 80-89Yrs. In that 83.8% of resistant hypertensive

patients falls between the age group of 40-79Yrs.According to the Occupation, 7% of hypertensive patients (n=14) doing business, 8.5% of hypertensive patient are in daily wages, 49% of hypertensive patients(n=98) are house wives ,25.5% of hypertensive patients(n=51) are in monthly wages, 4% of hypertensive patients (n=8) are retired, 6% of hypertensive patients (n=12) are tailor. In that 50% of resistant hypertensive patients are house wives and 26.9% of resistant hypertensive patients are in monthly wages. House wife and monthly wages have high rate of resistant hypertension. Considering Family history of hypertension, 21.5% of patients (n=43) have family history of hypertension, in that 12.3% of resistant hypertension (n=16) patients have family history of hypertension. According to Personal habits, 70% of hypertensive patients (n=140) not having any personal habits like smoking, alcohol, whereas 6% of patients (n=12) are alcoholic, 2% of patients (n=4) are smokers, 22% of patients (n= 39) are taking both alcohol and smoking. In resistant hypertension, 3.84% of patients (n=5, p=0.001) are alcoholic, 3% of patients (n=4, p=0.001) are smoker and 30% (n=39, p=0.001) are both alcoholic and smokers and 63% of patients (n=82, p=0.001) have no such habits .The person who doesn't have any personal habit as high rate of prevalence of resistance hypertension (p=0.001). Considering physical activity, 98% of hypertensive patients(n=196) are not doing their physical activity, only 4% of hypertensive patients(n=4) are doing their physical activity regularly. About 5% of resistant hypertension (n=2,p=0.525) patients doing their physical activity and 98.4% of resistant hypertensive (n=128,P=0.525) patients not doing their physical activity. Resistant hypertension patient who are all not doing physical activity have higher rate of resistant hypertension (p=0.525). According to comorbidity in hypertensive patients, 33% are hyperlipidemia (n=66), 14.5% are chronic kidney disease(n=29), 22% are cardiovascular disease(n=44), 5% are anemia (n=10), 4.5% are edema (n=9), 2.5% are congestive cardiac failure (n=5),3% are bronchial asthma(n=6), 12.5% are constructive obstructive pulmonary disease (n=25), 4% are thyroid disease(n=8), 82.5% are diabetis mellitus(n=165), 0.5% are post-ptca (n=1) in hypertensive patients. According to comorbidity in resistant hypertensive patients , 42.3% of resistant hypertension patients have hyperlipidemia (n=55,p=0.000)  and 92.3% of resistant hypertensive patients  have diabetes mellitus(n=120,p=0.000), 20% of patients have chronic kidney disease(n=26,p=0.000) and 30% have cardiovascular disease(n=39,p=0.000).  In our study,44.2% of hypertensive patients are in the group of normal BMI(N=31,p=0.309), 42.8% of hypertensive patients are in the group of pre-obesity(n=30,p=0.309), 5.7% are in class 1 obesity(n=4,p=0.309), 1.4% are class 2 obesity(n=1,p=0.309), 2.8% are class 3 obesity(n=2,p=0.309),2.85% are  under weight(n=2,p=0.309). in that 49.2% of resistant hypertension patients were in the group of normal BMI(n=64,p=0.309) ,30.2% of resistant hypertensive patients are in the group of pre-obesity(n=40,p=0.309), 10% are in class 1 obesity (n=13, p=0.309), 3.8% are in class 2 obesity (n=5,p=0.309) and 0.7% are in class 3 obesity (n=1,p=0.309), 5.3% are under weight(n=7,p=0.309). Resistant hypertension patients in normal BMI have higher prevalence of resistant hypertension. In study conducted by the Rabia Naseem et al[7] in 2017 reported that in their study more than half of the patients with resistant hypertension were obese (58.1%,p=0.001).According to dietary noncompliance, 87.1% (n=61,p=0.000) of hypertensive patients are not following the diet  , 12.8%(n=9,p=0.000) of hypertensive patients are following their diet. In that 37.6% (n=49,p=0.000) of resistant hypertension patients are following their diet properly, 62.3% (n=81,p=0.000) of resistant hypertension patients were not following the diet. Both In hypertensive and resistant hypertensive patients who are al not following the recommended diet have high rate of prevalence.Considering type of diet, 94.2 %(n=66,p=0.734) of hypertensive patients are taking both veg and non-veg, 5.7%(n=4,p=0.734) are vegetarian. In that 95.3%(n=120,p=0.734) of resistant hypertension patients are taking both veg & non- veg, 4.6%(n=6,p=0.734) of resistant hypertension patients were vegetarian.According to the Class of drug taken by hypertensive patients 54.2% of patients taking one class of drug (n=38,p=0.001), 50% of patients taking two class of drugs(n=35,p=0.001), 65% of patients taking three class of drug(n=130) , so patients who are all taking three class of drugs comes under resistant hypertension , in our study 130 patients taking three class of drugs considered as resistant hypertension(p=0.001) and 70 patients taking one (or) two class of drugs comes under hypertensive.According to antihypertensive drug classification ,46.5%(N=93) of hypertensive patients taking angiotensin converting enzyme inhibitors, 76.5%(n=153) of hypertensive patients are taking calcium channel blockers,34.5%(n=69) of hypertensive patients taking angiotensin receptor blockers, 43%(n=86) of hypertensive patients taking diuretics,45.5%(n=91) of hypertensive patients taking beta blockers, 1.5%(n=3) of hypertensive patients taking nitroglycerine. In that 61.5%  of resistant hypertensive patients taking diuretics(n=80,p=0.000) and 58.4% of resistant hypertensive patients are taking angiotensin converting enzyme inhibitors(n=76,p=0.000),56.1% of resistant hypertensive patients taking beta blockers(n=73, p=0.000) and 43% of resistant hypertensive patient taking angiotensin receptor blockers(n=56,p=0.001), 78.4% of resistant hypertensive patients taking calcium channel blockers(n=102,p=0.373) and 2.3%  of resistant hypertensive patients taking nitroglycerin(n=3,p=0.200)in our study.To identify the medical adherence of the resistant hypertension patients we categorized  into 3 groups

which is poor adherence ,medium adherence and high adherence, in hypertensive patients 60%(n=42,p=0.744) of patients have poor medication adherence, 38.5%(n=27,p=0.744) of patients have medium medication adherence, 1.4%(n=1,p=0.744) of patients have high medication adherence.  In resistant hypertension only 3% patients (n=4,p=0.744)  have high medical adherence, 56.9%(n=72,p=0.744) of patients were poor medication adherence and 40% (n=52,p=0.744)have medium medication adherence. Out of  130 resistant hypertensive patients, only 3% of patients were aware about taking antihypertensive drugs.Prevalence of resistant hypertension in our study was 65% , and study conducted by Rabia naseem et al[7]in 2017 shows the prevalence Resistant hypertension was 12%.

**CONCLUSION:**
Resistant hypertension is more prevalent in our study (n=130,65%) and its  prevalence is on the rise among the people  ≥40 years of age, patients with normal BMI, patients who all are not following their physical activity, personal habits, recommended diet, and their antihypertensive medication. In our study, co morbidities play a key role in resistant hypertension. The majority of resistant hypertension patients have diabetes mellitus, hyperlipidemia, coronary artery disease, and chronic renal disease, all of which are more prevalent in resistant hypertension patients.

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