

## Prevalence of Resistant Hypertension in Hypertension and Research Center, Rangpur

Ratindra Nath Mondal<sup>1\*</sup>, Mahfuj-Ul-Anwar<sup>2</sup>, Shah Md Sarwer Jahan<sup>2</sup>, ASM Rahenur Mondol<sup>2</sup>, Md Mokhlesur Rahman Sarker<sup>2</sup>, Md Al Fatah Al Adiluzzaman<sup>2</sup>, Narayan Chandra Sarkar<sup>2</sup>, Moni Rani<sup>3</sup>, Sajeda Afrin<sup>2</sup> and Md Zakir Hossain<sup>4</sup>

<sup>1</sup>Hypertension and Research Center, Rangpur, Bangladesh

<sup>2</sup>Rangpur Medical College, Rangpur, Bangladesh

<sup>3</sup>Rajshahi Medical College, Rajshahi, Bangladesh

<sup>4</sup>Shaheed Ziaur Rahman Medical College, Bogra, Bangladesh

**\*Corresponding Author:** Ratindra Nath Mondal, Hypertension and Research Center, Rangpur, Bangladesh.

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### Abstract

**Background:** Now a days hypertension is a major public health problem due to its complications like cardiovascular diseases, stroke, chronic kidney disease and peripheral vascular disease.

**Subjects and Methods:** This was a cross sectional study, carried out in Hypertension and Research Center Rangpur, Bangladesh. Assuming unknown prevalence of resistant hypertension a sample size of 384 will be calculated to give the true prevalence with a precision of 5% with 95% of confidence level. On an average about 30 patient visit to Hypertension and Research Center, Rangpur daily. From the daily visited patients every 3rd patient was included in this study.

**Results:** In this study, we have examined a total of 351 people of both sexes. In our study 97.2% (341) patients taking the drugs regularly. So, the prevalence of resistant hypertension among the patient who taking the antihypertensive drug regularly was 15.83% (54). Uncontrolled hypertension was in 21.9%. Prevalence of resistant hypertension was more in male than female (59.3% vs 40.7%). Resistant hypertension were more common in comparatively older age patients (55.88 vs 50.49 years), those who continued smoking (11.2% vs 2.7%), were physically inactive (18.5% vs 10.1%), did not do regular exercise (59.3% vs 51.9%), obese (16.7% vs 10.4%) and longer duration of hypertension. Resistant hypertension was also common among those intake NSAID (5.56% vs 1.68%) and steroid concurrently (3.70% vs 2.02%). Target organ damage e.g. IHD (31.48% vs 9.09%) and CKD (3.70% vs 2.35%) were more in resistant hypertensive than non-resistant hypertensive patient.

**Conclusion:** In our study approximately one-sixth of the hypertensive patients had resistant hypertension. older age, physical inactivity, irregular exercise (30 minutes of walking), irregular follow up and increasing duration of hypertension are associated with resistant hypertension.

**Keywords:** Resistant; Hypertension; Center; Rangpur

### Introduction

Bangladesh has been experiencing an epidemiological transition from communicable disease to NCDs [1] due to economic development and increased level of control and treatment of infectious diseases [2]. Hypertension is a worldwide problem that affects up to

50 million people in the United States and approximately one billion worldwide and is the single most important modifiable risk factor for stroke [3-5]. A marked increase in prevalence of hypertension (from 11.3% to 17.9%) was observed in Bangladesh from 1999 to 2010 [6,7]. In Rangpur division (Northern part) of Bangladesh prevalence of hypertension and pre-hypertension is 33.3% and 29.9% respectively [8]. Hypertension associated with earlier changes in organ systems in the body, such as left ventricular hypertrophy (LVH), proteinuria and renal failure, retinopathy and vascular dementia which are grouped under the term “target organ damage” (TOD) [9]. Ratindra, *et al.* has shown that majority (71.2%) of the hypertensive patients died due to hypertension related complications (detected from verbal autopsy); 33.3% due to stroke, 20.3% CAD and 17.8% chronic kidney disease [10]. Long term optimization and control of blood pressure is essential to avoid morbidity and mortality in these patients. However, it is not uncommon to see poorly controlled hypertension and it is estimated that only 1/3 of patients on treatment have their blood pressures well controlled [11]. Meta analyses have demonstrated a linear relationship between level of blood pressure (BP) and risk for cardiovascular events [12-14]. Suboptimal BP control is, consequently, the most common attributable risk for death worldwide, responsible for 62% of cerebrovascular disease and 49% of ischemic heart disease as well as an estimated 7.1 million deaths a year [13]. Several large hypertension outcome trials also demonstrate a failure to achieve BP goals in spite of protocol-defined treatment regimens. In these trials, 20% to 35% of participants could not achieve BP control despite receiving 3 antihypertensive medications [15-17]. Because of the high prevalence of hypertension and the increased morbidity and mortality associated with this condition, the economic cost of hypertensive disease was estimated at \$76.6 billion in 2010 [18]. Managing resistant hypertension is difficult and involves expensive testing to look for underlying secondary causes. Furthermore, patients with uncontrolled blood pressure are more likely to have target organ damage and have higher cardiovascular risks than patients with well controlled blood pressure [19].

Therefore, this study was undertaken to determine the prevalence and risk factors of resistant hypertension in essential hypertensive patients of ‘Hypertension and Research Center Rangpur, Bangladesh’.

### Populations and Methods

This was a cross sectional study, carried out in Hypertension and Research Center Rangpur, Bangladesh, from 1<sup>st</sup> July 2018 to 31<sup>st</sup> December 2018. This center serves only hypertensive patients and working enormously to generate awareness of hypertension. Till date more than 25 thousand patients registered in this center. Assuming unknown prevalence of resistant hypertension a sample size of 384 will be calculated to give the true prevalence with a precision of 5% with 95% of confidence level. On an average about 30 patient visit to Hypertension and Research Center, Rangpur daily. From the daily visited patients every 3<sup>rd</sup> patient was taken to generate sample of 384. The first patient was chosen randomly from hypertensive patients 1 to 10. The patients who visited the center for the 1<sup>st</sup> time, diagnosed as secondary hypertension, getting treatment of hypertension for less than 3 months, who were too ill/unable to answer the questionnaire and patients who did not consent were excluded from the study.

### Data collection

An informed consent was obtained before measuring the blood pressure. Blood pressure was measured by auscultation, using the standardized sphygmomanometer. All the participants were requested to take rest for ten minutes before measuring the blood pressure. The individual was seated in a chair with his back supported and his arms bared and supported at heart level and was refrained from the use of tobacco in any form or ingestion of caffeine during the 30 minutes preceding the measurement. Two separate readings were taken at an interval of minimum three minutes. The average of the two readings was taken. If systolic blood pressure differ > 10 mm of Hg and diastolic > 5 mm of Hg, then more 2 or 3 readings was taken. Systolic blood pressure measured at the appearance of the Korotkov’s sounds (Phase I) and Diastolic BP was taken at the point of disappearance of the sounds (Phase V). The following data were collected; socio-demographic details, duration of disease, medication history, risk factors, complications and other co morbidities. The following risk factors were evaluated; history of smoking, smokeless tobacco (jorda, gul) and alcohol consumption, drugs (Non-Steroidal Anti-Inflammatory Drugs, Steroids and Oral Contraceptive Pills), family history, high salt intake and presence of obesity. The antihypertensive drugs currently

used by the patients were recorded according to their classes and drugs used for other co-morbidities were also documented. Patients' compliance to treatment was also evaluated.

### Procedure of data analysis

After collection of data it was coded and checked manually and then entered into computer. Data analysis was done according to the objectives of the study by using SPSS-17.0 (Statistical Program for Social Science) software program. The result of the clinical study and statistical analysis is presented in the form of text, table, bar and chart.

### Operational definitions

Resistant hypertension was defined as "Suboptimal blood pressure despite using three antihypertensive agents inclusive of a diuretic and patients who need 4 or more drugs to control blood pressure also called resistant hypertension" [20].

### Ethical consideration

The ethical committee of Hypertension and Research Center Rangpur has approved the study protocol and questionnaire on 5<sup>th</sup> April 2018.

### Results

In this study, we examined a total of 351 people of both sexes. Male were more common than female (53.6% vs 46.4%). Mean age of the study population was 51.32 years. Table 1 shows the socio-demographic characteristics of the study population.

Variables	Frequency	Percentage (%)
Mean age	51.32 years ( $\pm$ SD 10.94) (age range 23 - 93 years)	
Sex Male	188	53.6%
Female	163	46.4%
<b>Level of education</b>		
Illiterate	110	31.3%
$\leq$ 10 class	166	47.29%
$>$ 10	75	21.36%
<b>Occupation</b>		
Housewife	145	41.31%
Agriculture	25	7.12%
Business	34	9.86%
Service	97	27.63%
Others	50	14.24%
<b>Monthly income</b>		
$<$ 5000 taka*	184	52.4%
5001 - 10000 taka	91	25.9%
$>$ 10000 taka	76	21.65%

**Table 1:** Socio-demographic characteristics of the study subjects (n = 351).

\*1 dollar = 82 taka.

At the time of diagnosis of hypertension, 13.67% (48) were smoker and average duration of smoking was 11.31 pack year (range 5 - 24). At present 16.66% (8) patients continued smoking, 12.5% (6) patient smokes occasionally and remaining quitted smoking. Smokeless tobacco (SLT) was taken by 10.3% (36) patients for mean duration of 12.66 years. Among the SLT users majority 72.22% used to take jorda (raw leaf of tobacco that people usually used to take with betel nut) and 16.66% used to take gul (those are also raw tobacco leaf in powder form that people used to take inner side of the lower lip or undersurface of tongue). At present 27.77% patient continued SLT intake, 50% uses occasionally and remaining quitted SLT intake. Smokers are mainly male 97.9%. On the other hand SLT users are mainly female (66.7%).

Variable	Resistant hypertension		Non-resistant hypertension	
	Frequency	Percentage	Frequency	Percentage
Age (years)	55.88 (SD ± 11.69)		50.49 (SD ± 10.60)	
Mean	Age range 34 - 93 years		Age range 34 - 93 years	
Sex (M:F)	32:22	59.3%:40.7%	156:141	52.5%:47.5%
History of taking added salt currently	2	3.7%	7	2.4%
Continued smoking	6	11.2%	8	2.7%
Continued SLT	1	1.9%	7	2.4%
Physical inactivity	10	18.5%	30	10.1%
<b>Exercise (30 minutes walking)</b>				
Irregular exercise	32	59.3%	154	51.9%
No exercise	4	7.4%	134	45.1%
<b>BMI</b>				
Mean	26.32 kg/m <sup>2</sup>		25.76 kg/m <sup>2</sup>	
Overweight (25 - 29.9 kg/m <sup>2</sup> )	23	42.6%	150	50.5%
Obese (≥ 30 kg/M <sup>2</sup> )	9	16.7%	31	10.4%
Central obesity	54	100%	297	100%
Regular follow up	34	63%	223	75.5%
Duration of hypertension	Mean 5.25 years Range 1 - 25 years		Mean 3.67 years Range 0.41 - 30 years	

**Table 2:** Showing factors associated with resistant hypertension (n = 54).

In our study 97.2% (341) patients taking the drugs regularly. So, the prevalence of resistant hypertension among the patient who taking the antihypertensive drug regularly was 15.83% (54). Uncontrolled hypertension was in 21.9%. Prevalence of resistant hypertension was more in male than female (59.3% vs 40.7%). Table 2 showing factors associated with resistant hypertension.

In our study other than antihypertensive PPI was the most commonly used drug by the patient 34.47%, followed by NSAIDs 3.41% and steroid (0.85%). Among the patients with resistant hypertension 38.89% concurrently used PPI. Table 3 showing the drug used in resistant hypertension and non-resistant hypertension group.

Among the target organ damage IHD was the maximum 12.53% in our study population, followed by LVH 3.70% and CKD 2.56%.

Variables	Resistant hypertension	Non-resistant hypertension
PPI	38.89%	34%
NSAIDs	5.56%	1.68%
Steroid	3.70%	2.02%

**Table 3:** Showing the drug used in resistant hypertension and non-resistant hypertension group.

Variables	Resistant hypertension	Non-resistant hypertension
Ischaemic heart disease	31.48% (17)	9.09% (27)
LVH	1.85% (1)	4.04% (12)
CKD	3.70% (2)	2.35% (7)
Stroke	00	00

**Table 4:** Showing the TOD in resistant hypertension and non-resistant hypertension group.

LVH: Left Ventricular Hypertrophy; MI: Myocardial Infarction.

## Discussion

Main target of hypertension management is to control the blood pressure. Uncontrolled blood pressure raises the possibility of development of target organ damage. The control of hypertension in many studies [21,22] ranges from 17.6% to 36.06% in Bangladesh. In our study blood pressure was controlled in 62.27%. Suboptimal blood pressure control reported from developed western countries [23-25]. This sub optimal hypertension control includes two different entities: uncontrolled/poorly controlled hypertension and resistant hypertension. Uncontrolled hypertension is lack of blood pressure control secondary to poor adherence and/or an inadequate therapeutic regimen, while treatment resistance is suboptimal blood pressure despite using optimal therapy. Many studies have suggested the prevalence of uncontrolled hypertension to be around 50% of patients being treated for hypertension [26,27]. In our study prevalence of resistant hypertension was 15.83%, which was almost similar with a report from Srilanka 19.1%. Obesity is recognized as the sixth most important risk factor contributing to the overall burden of disease worldwide [28]. Obesity is associated with more severe hypertension, a need for an increased number of medications and a decreased likelihood of achieving blood pressure control [29]. Our studies also found the similar result, 16.7% were obese in resistant hypertension group and 10.4% were obese in non-resistant hypertensive patient.

In our study we have found that older age, physical inactivity, irregular exercise (30 minutes of walking), irregular follow up and increasing duration of hypertension are associated with resistant hypertension. Many other studies have shown similar result [30,31]. PPI was the most commonly used drug (other than antihypertensive drug) by the patient 34.47%. Though study [32] has shown that concomitant PPI therapy in hypertensive patients was associated with a small but statistically significant reduction in 24 hours BP our study found history of PPI use was more in resistant hypertension than non-resistant hypertension patients. Uncontrolled hypertension causes target organ damage (TOD) in the heart, brain, eyes, arteries and kidneys, and the coexistence of TOD and hypertension increases the overall cardiovascular risk [33]. In our study 17.4% of the patients had target organ damage. Target organ damage was significantly higher in resistant group than non-resistant group (37.03% vs 15.48%).

## Conclusion

In our study approximately one-sixth of the hypertensive patients had resistant hypertension. older age, physical inactivity, irregular exercise (30 minutes of walking), irregular follow up and increasing duration of hypertension are associated with resistant hypertension.

### Limitation of the Study

This was a center based study and sample size was small.

### Future Direction

Community based study with large sample size will be needed to determine the true prevalence and risk factor of resistant hypertension.

### Conflict of Interest

There was no conflict of interest.

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