

Proportion of Target Organ Damage in Hypertensive Patients: A Retrospective Study in a Tertiary Hospital in Dhaka, Bangladesh

Dr N M Farhaduzzaman¹; Dr.Mst. Nadira Parvin²; Md. Muarraf Hossain^{3*}

¹Grading course in medicine (AFMI) Bangladesh Army, Medicine Specialist, Border guard hospital, Bangladesh.

²Assistant Professor, Hamdard University Bangladesh.

³Managing Director, Research Academy, Dhaka, Bangladesh

*Corresponding Author. Md. Muarraf Hossain, Managing Director, Research Academy, Dhaka, Bangladesh

Abstract

Background: Despite being a middle-income country, Bangladesh faces a rising tide of hypertension, a major contributor to non-communicable diseases globally. **Aim:** To investigate the spectrum of target organ damage (TOD) in patients with hypertension admitted to a tertiary level hospital, Dhaka. **Methods:** This retrospective observational study included ninety patients (68 males, 22 females; aged 20-70+ years) with hypertensive complications admitted to the hospital from January to June 2015. Study focused on hypertension duration, risk factors, and past medical history. Inclusion criteria were diastolic BP > 90 mmHg, systolic BP > 140 mmHg, or isolated systolic hypertension (systolic BP > 160 mmHg, diastolic BP < 90 mmHg). Obesity (BMI > 30) and diabetes (fasting glucose > 7 mmol/L or 2-hour postprandial glucose > 11 mmol/L).

Complications were identified through physical examinations, chest X-rays, ECGs, urinalysis, blood tests, and fundus examination. Additional diagnostics included echocardiography, brain CT, abdominal ultrasound, and serum lipid profiles. Statistical analysis was performed using IBM SPSS Statistics 25.

Results: Ischemic heart disease (IHD) was the most common target organ damage (TOD), but showed a sex disparity (males: 88.89%, females: 11.11%). Modifiable risk factors like smoking 44.44% and sedentary lifestyle 50% were prevalent among stroke patients. Both TOD prevalence and risk factors were highest in newly diagnosed patients. Medication adherence also played a role, with stroke being more common in those with irregular use 29% vs. 11% regular use. Overall, stroke 60% was the most frequent.

Conclusion:

In this study, it found that in Bangladesh, Ischemic heart disease was more common in males, while retinopathy was more prevalent in females. Modifiable risk factors were associated with stroke incidence. Early hypertension detection, medication adherence, and lifestyle modifications are crucial for preventing TODs.

Keywords: Hypertension; Target Organ Damage; Sedentary lifestyle Stroke; Medication Adherence.

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I. Introduction

High blood pressure, or hypertension, represents a critical public health issue on a global scale. It is not just confined to developed nations; developing countries like Bangladesh and even the least developed regions face its significant impact. As a leading cause of both illness and death worldwide, hypertension is expected to become an even greater public health burden by 2020. The danger does not stop there. Beyond directly affecting health, high blood pressure significantly increases the risk of developing various cardiovascular diseases. One of the most concerning aspects is that hypertension is a prevalent condition, often without any symptoms. However, the good news is that it is readily detectable and typically treatable. Yet, neglecting treatment can lead to potentially fatal complications [1].

Healthcare providers frequently encounter patients who could significantly benefit from lowered blood pressure. This includes not only those diagnosed with hypertension but also individuals with prehypertension (systolic blood pressure 120 to 139 mmHg or diastolic blood pressure 80 to 89 mmHg). Notably, individuals with prehypertension have a higher risk of cardiovascular events compared to those with optimal or normal blood pressure.

Alarmingly, data suggests a concerning cascade in hypertension management. Only half of patients with hypertension are even diagnosed. Of those diagnosed, only half receive treatment, and only half of those treated achieve optimal blood pressure control [2].

Developed countries have demonstrably better control of hypertension compared to developing countries like Bangladesh. This highlights the need for significant improvement across the globe. Without

concerted efforts to address this disparity, the projected 1.6 billion people living with hypertension by 2025 will continue to experience higher rates of illness and premature death. These negative outcomes are preventable through effective diagnosis, treatment, and lifestyle modifications [3].

II. Methods

This retrospective observational study was conducted on 90 patients with hypertensive complications who were admitted to the medical wards of the Combined Military Hospital Dhaka between January to June 2015. The study comprised 68 males and 22 females, ranging in age from twenty to 70+ years. The selection of cases was random, and no distinction was made between primary and secondary hypertension. Data was analyzed using SPSS version 25.

A comprehensive history was taken from each patient, focusing on the duration of hypertension and risk factors, including smoking, family history of hypertension, diabetes mellitus, ischemic heart disease, stroke, sudden death, and previous treatment history. The study recruited participants who met at least one of the following criteria: diastolic blood pressure exceeding 90 mmHg or systolic blood pressure above 140 mmHg. Patients with isolated systolic hypertension (systolic BP > 160 mmHg and diastolic BP < 90 mmHg) were also included. Additionally, patients previously diagnosed with hypertension and on antihypertensive medications were included regardless of their current blood pressure readings.

Obesity was assessed by calculating the Body Mass Index (BMI) using the formula: BMI. According to Asian classification of BMI the patients >30 were classified as obese. A diagnosis of diabetes was made if the fasting blood glucose level exceeded 7.0 mmol/L or if the blood glucose level 2 hours after-breakfast was > 11 mmol/L.

Several diagnostic procedures were employed to detect complications of hypertension. Cardiovascular complications were identified through physical examination, chest X-ray, and electrocardiogram (ECG). Cerebrovascular complications were diagnosed based on clinical evidence of focal brain disease (e.g., hemiplegia, monoplegia, dysphagia, aphasia) and detailed temporal profiling of symptom onset, evolution, and course. Renal complications were detected via patient history, urinalysis, blood urea and serum creatinine levels, and 24-hour urinary protein measurement in selected cases. Hypertension was diagnosed in patients with diastolic blood pressure above 130 mmHg, rapid renal function deterioration, retinal hemorrhages, exudates, and papilledema. Ophthalmologic complications were identified through clinical examination and fundus ophthalmoscopy.

III. Results

This study investigated the sex distribution, prevalence of Target Organ Damage (TOD), and the influence of age, hypertension duration, and medication adherence on TOD in hypertensive patients. A total of ninety participants were included. Majority of the respondents (76%) was male and rest of them was female (Figure 1).

IHD was the most prevalent TOD, affecting 88.89% of males and 11.11% of females (Table 1). Conversely, retinopathy was more common in females 40% compared to males 60%.

Among patients with stroke, 44.44% were smokers, 24.07% had diabetes, and 50% reported a sedentary lifestyle (Table 2). This highlights the significant role of these modifiable risk factors in stroke.

Stroke increased with age, peaking at 31.48% in the 50-59 age group (Table 3). Similarly, the prevalence of most TODs, including renal insufficiency, LVH, and hypertension, increased with age.

Newly diagnosed hypertensive patients had the highest proportion of stroke 38.89%, TIA 66.67%, LVH 40%, and renal insufficiency 36% (Table 4). This emphasizes the importance of early hypertension detection and management to prevent complications.

Stroke was more common in patients with irregular medication use at 29% compared to those with regular use 11% (Figure 2). Conversely, retinopathy was only observed in patients with regular medication use, suggesting the potential protective effect of adherence.

Stroke was the most frequent TOD 60%, followed by renal insufficiency 27.78% and IHD 20% (Figure 3). These findings highlight the significant burden of stroke and other complications associated with hypertension.

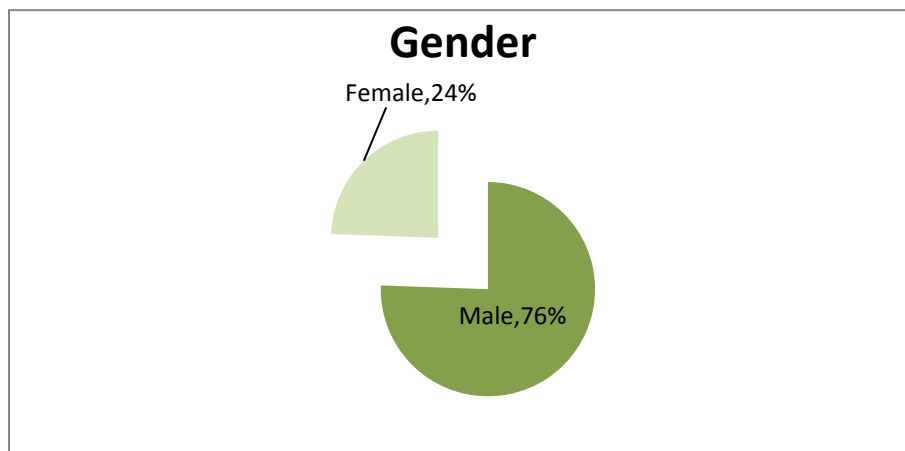


Figure-1: Distribution of the respondents by gender

Figure 1 shows that majority of the respondents (76%) was male and rest of them (24%) was female.

Table-1: Distribution of the respondents by Sex and prevalence of TOD (n=90)

Variables	Male	Female
Stroke	77.78%	22.22%
TIA	66.67%	33.33%
LVH	66.67%	33.33%
IHD	88.89%	11.11%
Renal insufficiency	88%	12%
Retinopathy	60%	40%
Hypertension	66.67%	33.33%

Table 1 shows the distribution of study participants by sex and the prevalence of TOD. Study shows that IHD was the most prevalent TOD, affecting 88.89% of males and 11.11% of females. Renal insufficiency was also more common in males 88% compared to females 12%. Conversely, retinopathy was more prevalent in females 40% compared to males 60%.

Table 2: Distribution of respondents by proportion of stroke and proteinuria in relation to risk factors and severity levels

Condition	Risk Factors & severity level	Number of Patients	Percentage
Stroke	Smoking	24	44.44
	Diabetes	13	24.07
	Sedentary lifestyle	27	50
	1+	4	4
Proteinuria	2+	4	4
	3+	5	5
	4+	0	0

Table 2 shows that among hypertensive patients with stroke, 44.44% were smokers, 24.07% had diabetes, and 50% had a sedentary lifestyle. This highlights the significant role of these risk factors in the incidence of stroke. For proteinuria, 4% of patients had 1+ and 2+ levels, while 5% had 3+ proteinuria, indicating varying degrees of renal involvement. There were no cases of 4+ proteinuria.

Table 3: Proportion of diseases according to age group

Disease	Age Group (years)					
	20-29	30-39	40-49	50-59	60-69	70+
Stroke	00.00%	7.40%	16.67%	31.48%	24.07%	20.37%
TIA	00.00%	66.67%	00.00%	00.00%	33.33%	00.00%
LVH	00.00%	6.67%	20.00%	33.33%	40.00%	00.00%
IHD	00.00%	16.67%	33.33%	27.78%	22.22%	00.00%
Renal insufficiency	00.00%	4.00%	12.00%	28.00%	44%	16%
Retinopathy	00.00%	20%	00.00%	40%	40%	00.00%
Malignant Hypertension	00.00%	00.00%	16.67%	50%	33.33%	00.00%

Table 3 illustrates the age-related proportion of various diseases among hypertensive patients. Stroke incidence increases with age, peaking at 31.48% in the 50-59 age group. TIA is most common in the 30-39 age group 66.67%. LVH peaks at 40% in the 60-69 age group. IHD is the highest 33.33% in the 40-49 age group. Renal insufficiency peaks at 44% in the 60-69 age group. Retinopathy is most frequent in 40% in the 50-59 and 60-69 age groups. Malignant hypertension is the highest 50% in the 50-59 age group.

Table 4: Proportion of diseases according to duration of hypertension

Disease	Newly Detected	<1 Year	1-2 Years	2-5 Years	5-10 Years	10-15 Years
Stroke	38.89%	5.55%	11.11%	18.51%	14.81%	11.11%
TIA	66.67%	0.00%	0.00%	33.33%	0.00%	0.00%
LVH	40%	6.67%	6.67%	33.33%	13.33%	0.00%
IHD	33.33%	16.67%	5.55%	16.67%	27.78%	0.00%
Renal insufficiency	36%	0.00%	12%	24%	28%	0.00%
Retinopathy	0.00%	0.00%	20%	40%	40%	0.00%
Malignant Hypertension	0.00%	0.00%	33.33%	50%	16.67%	0.00%

Table 4 shows disease proportion based on hypertension duration. Stroke is the most common in newly detected cases 38.89%. TIA is highest in newly detected cases 66.67%. LVH peaks at 40% in newly detected cases. IHD is prevalent in newly detected cases 33.33% and those with 5-10 years of hypertension 27.78%. Renal insufficiency is highest in newly detected cases at 36%. Retinopathy peaks at 40% in patients with 2-10 years of hypertension. Malignant hypertension is most frequent in those with 2-5 years of hypertension 50%.

Figure 2: Disease proportion based on drug adherence (n=90)

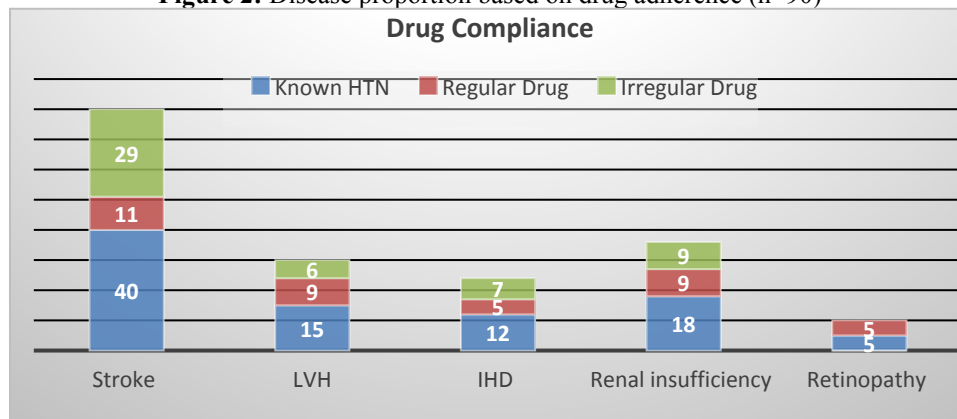


Figure 2 indicates that stroke is more common in patients with irregular drug use 29 than in those with regular use 11. LVH is slightly higher in regular users 9 compared to irregular users 6. IHD is more frequent in irregular users 7 than regular users 5. Renal insufficiency is equally common in both groups of 9 each. Retinopathy is found only in regular drug users 5, highlighting the importance of regular medication adherence in preventing complications.

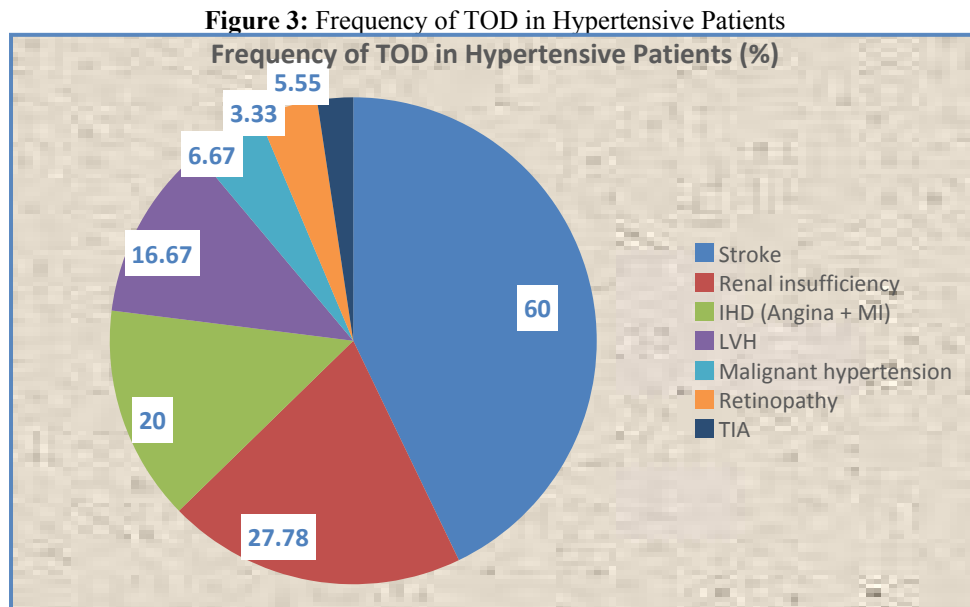


Figure 3 shows that stroke is the most common target organ damage 60% in hypertensive patients. Renal insufficiency follows at 27.78%, IHD at 20%, and LVH at 16.67%. Malignant hypertension affects 6.67%, retinopathy 3.33%, and TIA 5.55%.

IV. Discussion

Hypertension is a major global health concern, and Bangladesh is no exception [4,7]. This study investigated the influence of sex, age, hypertension duration, and medication adherence on TOD in Bangladeshi hypertensive patients. Our findings highlight the complexity of TOD development and the importance of a multi-faceted approach to management.

The observed sex disparity in TOD, with a higher prevalence of IHD in males 88.89% and retinopathy in females 40% [8,9], aligns with previous reports. For instance, a study by Ekram et al. (2002) examining female hypertensive patients in Egypt found a 32.4% prevalence of retinopathy [5]. Study findings 40% are similar, suggesting a potential global trend of higher retinopathy prevalence in females with hypertension. Conversely, our data on IHD prevalence in males 88.89% is higher than the 23.1% reported by Masum et al. (2008) in Bangladesh [9]. This difference could be due to variations in sample characteristics, such as age distribution or underlying comorbidities.

This study also supports the established association between modifiable risk factors and stroke incidence. We observed that 44.44% of stroke patients were smokers, which is consistent with findings from other studies. For example, a meta-analysis by O'Kelly et al. (2007) reported a 1.9-fold increased risk of stroke in smokers compared to non-smokers [12]. Similarly, our finding that 50% of stroke patients reported a sedentary lifestyle aligns with previous research demonstrating a positive association between physical inactivity and stroke risk.

The finding that newly diagnosed patients had the highest prevalence of TOD (stroke: 38.89%, TIA: 66.67%, LVH: 40%, renal insufficiency 36%) is concerning [6, 7]. This echoes the results reported by Sharma et al. (2006) in Pakistan, where newly diagnosed hypertensives had a significantly higher prevalence of LVH compared to those with established hypertension [11]. These findings suggest potential underdiagnosis and delayed treatment initiation in both Bangladesh and other parts of the world. There is a need for improved hypertension screening programs, particularly in low- and middle-income countries with a rising burden of hypertension like Bangladesh [4].

The data underscore the importance of medication adherence in preventing TODs like stroke. Study observed a clear association between irregular medication use 29% and higher stroke risk compared to regular use 11%. This aligns with multiple studies demonstrating the protective effects of medication adherence on cardiovascular outcomes. A meta-analysis by Bangalore et al. (2016) found that medication adherence was associated with a significant reduction in stroke risk [13].

Limitations of the study

- This study was conducted at a single tertiary level hospital, limiting the generalizability of the findings to the broader Bangladeshi population. A multicenter study encompassing a more diverse demographic would provide a more comprehensive picture of TOD prevalence in Bangladesh.
- The small sample size restricts the statistical power of the study and may limit the detection of weaker associations between variables.
- The study's retrospective design relies on self-reported data on medication adherence and lifestyle habits, which can be prone to recall bias.

Recommendations

- Implement nationwide hypertension screening programs for early detection, especially in high-risk groups.
- Promote public education on hypertension and its complications.
- Encourage smoking cessation, increased physical activity, and medication adherence for hypertension management.
- Conduct further research on sex disparity in TOD prevalence.

V. Conclusion

This study identified a sex disparity in TOD among Bangladeshi hypertensives, with ischemic heart disease in males and retinopathy in females. Modifiable risk factors were linked to stroke. Early hypertension detection, medication adherence, and lifestyle changes are essential for preventing TODs. Further research is needed to confirm these findings and inform strategies to reduce TOD burden in Bangladesh.

Conflict of Interest:

No conflict of interest.

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