

ORIGINAL ARTICLE

Clinical Characteristics and Comorbidity Patterns Among Patients with Hypertension Attending a Tertiary Care Hospital

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ABSTRACT

Background: Hypertension is a common non-communicable disease and a major cause of cardiovascular morbidity and mortality. It often exists concurrently with other chronic illnesses, which places a burden on the disease and makes its management difficult. To evaluate clinical features and disease burden in hypertensive patients of a tertiary care teaching hospital. **Methods:** This cross-sectional study enrolled 320 adult hypertensive patients by consecutive sampling. Sociodemographic and clinical parameters such as body mass index (BMI), duration and severity of hypertension, family history, smoking history, medication adherence, and comorbidity were gathered from a structured questionnaire and medical record review. The data were analyzed using SPSS 26.0. Associations were evaluated by the Chi square test, $p < 0.05$ was regarded as statistically significant. **Results:** Most participants were aged 45–59 years (43.1%), male (54.4%), and urban residents (59.4%). 55.6% of patients had stage 2 hypertension. The most frequent comorbidities were diabetes mellitus (45.6%), dyslipidemia (41.9%), and obesity (32.5%). Multiple comorbidities were statistically significantly associated with older age, obesity, hypertension duration >10 years, smoking, and non-adherence to medications ($p < 0.05$). **Conclusion:** Hypertension is commonly associated with multiple chronic conditions. Comprehensive management, including early identification of high-risk patients and regular screening for complications, can help minimize complications and enhance long-term outcomes.

Keywords: Hypertension, Clinical Characteristics, Comorbidities, Multimorbidity, Medication Adherence.

INTRODUCTION

Hypertension is one of the most prevalent non-communicable diseases and a significant public health issue around the globe ¹. It is an important modifiable risk factor for cardiovascular disease, stroke, chronic kidney disease and premature mortality ². It is estimated that over a billion adults worldwide suffer from hypertension, and it is increasing with age and population growth, poor diets, lack of exercise, obesity, and smoking ³. Even though diagnosis and treatment have improved, there are still numerous patients with uncontrolled blood pressure that can lead to significant complications, imposing a significant burden on health care systems ⁴. Not only blood pressure control is important in management of hypertension, but early clinical recognition of associated conditions and risk factors as well.

Hypertension rarely exists in isolation, and is often linked to other chronic health conditions ⁵. Hypertension is frequently associated with diabetes mellitus, dyslipidemia, obesity, coronary artery disease, chronic kidney disease, heart failure and stroke, which share multiple underlying pathophysiological mechanisms and lifestyle-related risk factors ⁶. Multiple chronic diseases, known as multimorbidity, often coexist and can lead to greater complexity of care, medications, health care costs, and adverse clinical outcomes ⁷. Patients who have multiple comorbidities may need holistic treatment and frequent follow-ups to prevent the disease from progressing and to enhance their life quality ⁸. Thus, it is critical to recognize the clinical phenotype and co-morbidities of hypertensive individuals in designing successful prevention and management strategies ⁹.

Some research has shown differences in the prevalence and distribution of hypertension related comorbidities in various populations ¹⁰. These differences can be explained by demographic factors, socio-economic status, health care availability, and lifestyle behaviors ¹¹. Poor healthcare access, delayed diagnosis, and poor adherence to treatment add to the burden of multiple chronic conditions among hypertensive patients in low- and middle-income countries. Local data on the natural history of hypertension and comorbidities are however limited, especially at tertiary care hospital where patients with hypertension tend to have more advanced disease and multiple health issues. The present study was done to determine the clinical features and comorbidity profile of hypertensive cases in a tertiary care teaching hospital. It also aimed to identify the factors associated with multiple comorbidities in this patient population. This research could aid clinicians in identifying high-risk individuals and encourage more holistic treatment of disease, as well as the implementation of targeted interventions to mitigate hypertension-related complications and enhance patient outcomes over time.

METHODOLOGY

This is a cross-sectional study carried out in a Tertiary Care Teaching Hospital in Karachi for a period of 8 months from January to August 2023 in the Department of Medicine. The study aimed to evaluate clinical characteristics and comorbidity pattern of the patients with hypertension. A consecutive sampling method was used to enroll 320 hypertension patients based on a confirmed diagnosis, using the formula $n = Z^2 P(1-P)/e^2$ for sample size calculation. Adults (age 30 years and older) with primary hypertension and who had attended the Department of Medicine during the study period were included. The study excluded patients with incomplete medical records, patients with severe acute illness who needed emergency intervention as well as patients with secondary hypertension or pregnancy-induced hypertension.

Data were collected by employing a structured data collection form by conducting interviews with patients and reviewing their medical records. Sociodemographic data consisted of age, gender, body mass index (BMI), education, and place of residence. Body height and weight were derived from clinical notes or measured at the time of hospital visit and Body mass index was grouped as normal, overweight and obese using the classification of the WHO. The clinical variables were duration of hypertension, stage of hypertension, family history of hypertension, smoking and adherence to medication. Hypertension stage was defined by the blood pressure recorded in the patients' clinical record. Smoking status was classified as either 'current or former smoker' or 'never smoked'. The level of adherence to prescribed antihypertensives was evaluated by the patient's self-reported adherence, and was defined as good, or poor/moderate. Comorbidities were extracted from clinical diagnosis documented in medical records. Comorbid conditions evaluated comprised diabetes mellitus, dyslipidemia, obesity, coronary artery disease, chronic kidney disease, stroke, heart failure and chronic obstructive pulmonary disease (COPD)/ asthma. Participants were also divided into two groups for analysis: those with one or none of the comorbidities (≤ 1) and those with two or more comorbidities (≥ 2) to identify factors associated with multimorbidity.

Statistical Analysis Data were coded and analyzed with the Statistical Package for the Social Sciences (SPSS) version 26.0 (Released 2019; IBM Corp., Armonk, NY, USA; RRID:SCR_016479). Frequencies and percentages were used to summarize categorical variables. The Chi-square test was used to test the associations between selected demographic and clinical variables and multiple comorbidities. The p value of <0.05 was considered statistically significant. All participants gave written informed consent prior to data collection. Data collected was anonymised and confidentiality of the participants was maintained throughout the study by using unique identification numbers and limiting access to the data to the research team.

RESULTS

A total of 320 patients with hypertension were included in the study. Out of 320 hypertensive patients, 138 were in the 45-59 years (43.1%) followed by ≥ 60 years age group 118 (36.9%). The study population consisted of 174 (54.4%) males and 190 (59.4%) urban residents. As far as the educational level was concerned, the highest level was primary education (30.6%). Based on BMI classification, 132 (41.2%) of participants were overweight and 104 (32.5%) were obese. Sociodemographic and anthropometric data of the study subjects are summarized in **Table I**.

Table I: Socio-demographic Characteristics of the Participants (n = 320)

Variable	Category	Number (n)	Percentage (%)
Age (years)	30–44	64	20.0
	45–59	138	43.1
	≥ 60	118	36.9
Gender	Male	174	54.4
	Female	146	45.6
Residence	Urban	190	59.4
	Rural	130	40.6
Educational Status	No formal education	68	21.3
	Primary	98	30.6
	Secondary	94	29.4
	Higher education	60	18.7
BMI Category	Normal	84	26.3
	Overweight	132	41.2
	Obese	104	32.5

The clinical features of the hypertensive patients are shown in **Table II**. 126 (39.4%) had a disease duration of less than five years and 26.9% had a disease duration of more than 10 years. Over half of the participants 178 (55.6%) had stage 2 hypertension. 184 (57.5%) of patients had a positive family history for hypertension. The majority of participants had not smoked 208 (65.0%) and good adherence to medications was noted in 182 (56.9%) of the study population.

Table II: Clinical Characteristics of Hypertensive Patients (n = 320)

Variable	Category	n	%
Duration of Hypertension	<5 years	126	39.4
	5–10 years	108	33.7
	>10 years	86	26.9
Hypertension Stage	Stage 1	142	44.4
	Stage 2	178	55.6
Family History of Hypertension	Yes	184	57.5
	No	136	42.5
Smoking Status	Current/Former smoker	112	35.0
	Never smoker	208	65.0
Medication Adherence	Good	182	56.9
	Poor/Moderate	138	43.1

Distribution of comorbidities among the patients with hypertension is shown in **Table III**. The most common comorbidities reported were diabetes mellitus 146 (45.6%), dyslipidemia 134 (41.9%), and obesity 104 (32.5%). Other complications were also prevalent, such as

cardiovascular complications 66 (20.6%) and renal complications 42 (13.1%). Smaller portions of the study population were identified as having stroke, heart failure, and COPD/asthma.

Table III: Comorbidity Patterns Among Hypertensive Patients (n = 320)

Comorbidity*	Number (n)	Percentage (%)
Diabetes mellitus	146	45.6
Dyslipidemia	134	41.9
Obesity	104	32.5
Coronary artery disease	66	20.6
Chronic kidney disease	42	13.1
Stroke	26	8.1
Heart failure	30	9.4
COPD/Asthma	38	11.9

*Participants could have more than one comorbidity; therefore, percentages do not total 100%.

The association between selected clinical variables and having multiple comorbidities is shown in **Table IV**. Poor to moderate medication adherence, current or former smoking, older age (≥60 years), obesity and duration of hypertension ≥10 years were all significantly associated with 2 or more comorbid conditions (p < 0.05). These results indicate that patient-related and disease-related factors play a role in the burden of multimorbidity among hypertensive patients.

Table IV: Factors Associated with Multiple Comorbidities Among Hypertensive Patients (n = 320)

Variable	≤1 Comorbidity n	%	≥2 Comorbidities n	%	p-value
Age ≥60 years	50	28.4	68	47.2	0.001
Obese (BMI ≥30 kg/m ²)	42	23.9	62	43.1	0.002
Hypertension >10 years	30	17.0	56	38.9	<0.001
Current/Formal smoker	52	29.5	60	41.7	0.024
Poor/Moderate medication adherence	62	35.2	76	52.8	0.004

DISCUSSION

Hypertension is a very widespread chronic condition globally. This is a significant risk for cardiovascular disease morbidity and mortality. In addition, many patients are afflicted with other chronic diseases, which can make disease management more challenging. The present study was conducted to evaluate the clinical features and the pattern of the associated factors (comorbidity) of the people who had been admitted to the hospital as hypertensives. The majority of the participants were middle-aged or elderly and were slightly over-represented by males. There was a higher prevalence of Stage 2 hypertension than Stage 1 disease. The most common comorbidities were diabetes mellitus, dyslipidaemia and obesity. Moreover, there was significant association between some comorbidities and older age, obesity, longer duration of hypertension, smoking and poor medication compliance. The results indicate the importance of a holistic evaluation and early treatment of hypertension.

The clinical profile seen in this study is in line with previous studies. The majority of the participants were over the age of 45. The same age patterns have been found in hospital based studies ¹². Age is a well-known risk factor for hypertension, due to age related changes in the arteries and their stiffness ¹³. Over half of the participants were in stage 2 hypertension. This finding could be due to delayed diagnosis, inadequate control of blood pressure or late presentation to the tertiary health care facility. In a previous study, patients who attended referral hospitals had a higher prevalence of Stage 2 hypertension ¹⁴. Genetic factors and environment play a role as more than half of the participants had a positive family history of hypertension. Many of the patients had good adherence to the medicines, but a significant minority had moderate or poor adherence. Poor adherence has also been described in recent studies and was a significant obstacle to good blood pressure management ¹⁵. Better patient education and routine follow-up care may lead to better adherence with treatment and fewer complications of hypertension.

In the present study too, comorbidities were found to be prevalent in the patients with hypertension. The most common comorbidities were diabetes mellitus, dyslipidaemia and obesity. The same trend is observed in other parts of the world, as mentioned in previous studies ¹⁶. The diseases often go together because of the shared risk factors such as obesity, physical inactivity, unhealthy diet, insulin resistance, and chronic inflammation. The study population also had a high prevalence of coronary artery disease and chronic kidney disease. Their presence is an indicator of the prolonged effects of uncontrolled hypertension to the cardiovascular system and kidneys. Other conditions such as stroke, heart failure and COPD/asthma were less common, but still important. Earlier research has demonstrated that having more than one chronic disease not only makes treatment more complex, but it also results in a higher medication burden and a higher healthcare cost ^{17,18}. It also leads to higher hospitalization and morbidity rates.

The association of multiple comorbidities to older age, obesity, longer duration of hypertension, smoking and poor medication adherence was another important finding of this study. Previous studies have reported similar associations ^{19,20}. Age-related changes in the body and a lifetime accumulation of cardiovascular risk factors increase the risk for older adults to experience multiple chronic diseases ^{21,22}. Obesity is another strong factor of multimorbidity. This contributes to the development of diabetes, dyslipidemia and cardiovascular disease via metabolic and inflammatory pathways. There is also an increased risk of target-organ damage among patients with hypertension who have had hypertension for longer. Earlier research also showed that smoking leads to vascular damage and heightens the risk of cardiovascular problems ²³. Similarly, failure to take the medicines as prescribed to the patient leads to increased blood pressure and worsening of the disease. Such results highlight the need for lifestyle modification, cessation of smoking, weight management and adherence counselling to lessen the burden of multimorbidity in patients with hypertension.

There are some limitations in this study. First, its cross-sectional design does not allow causal relationships to be established. Second, this study was carried out in a single tertiary care hospital, and its findings may not be applicable to other hospitals. Furthermore, smoking status and adherence to medication was partially self-reported and might have been subject to reporting bias. More prospective studies with larger sample sizes are recommended in the future at multiple centers. Further studies are also needed to explore how lifestyle factors, socioeconomic status, diet, physical activity, and biochemical markers contribute to the development of multimorbidity in patients with hypertension.

CONCLUSION

Chronic conditions are often co-morbid with hypertension and can add to the burden of disease and make it difficult to manage the patient. The most common comorbidities in the hypertensive population were diabetes mellitus, dyslipidaemia and obesity in this study. There were

significant associations between multiple comorbidities and older age, obesity, longer duration of hypertension, smoking, and poor medication adherence. The findings indicate that screening, early risk assessment and overall management of patients with hypertension are very important. Encouraging healthy lifestyle and better medication adherence could diminish complications and better long-term clinical outcomes. Multicenter studies are recommended to confirm these results and to guide effective strategies to prevent and manage hypertension related comorbidities.

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