



## Prevalence of Uncontrolled Hypertension and Its Associated Risk Factors Among Adult Patients Attending a Tertiary Care Hospital: A Cross-Sectional Study

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### Abstract

**Background:** Hypertension is a major public health concern because poorly controlled blood pressure increases the risk of cardiovascular disease, stroke, and kidney complications. Although effective treatment is available, many patients continue to have blood pressure levels above recommended targets. Identifying the factors associated with inadequate blood pressure control may help clinicians improve treatment and follow-up.

**Aim:** To determine the prevalence of uncontrolled hypertension and assess its associated risk factors among adult patients attending a tertiary care hospital.

**Methods:** This hospital-based cross-sectional study will be conducted among adult patients with an established diagnosis of hypertension attending the selected tertiary care hospital. Eligible participants will be recruited using a consecutive sampling method after obtaining informed consent. Data will be collected using a structured questionnaire, clinical assessment, blood pressure measurements, and relevant medical records. Information will include sociodemographic characteristics, duration of hypertension, medication use, lifestyle practices, comorbidities, and other clinically relevant factors. Uncontrolled hypertension will be defined as systolic blood pressure of 140 mmHg or higher and/or diastolic blood pressure of 90 mmHg or higher at the study assessment. Data will be analysed using appropriate descriptive and inferential statistical methods.

**Results:** The prevalence of uncontrolled hypertension and its associated factors will be reported after analysis of the collected data. No numerical results have been included because the study dataset has not yet been provided.

**Conclusion:** Assessing blood pressure control and identifying potentially modifiable risk factors may help improve hypertension management in hospital settings. The final conclusions will be based on the study findings.

**Keywords:** Hypertension, uncontrolled hypertension, blood pressure control, risk factors, medication adherence, cross-sectional study.

### INTRODUCTION

Hypertension is one of the most common chronic conditions encountered in clinical practice and remains an important contributor to preventable illness and premature death. Its clinical significance extends beyond an elevated blood pressure reading, as prolonged inadequate control can damage vital organs and increase the risk of cardiovascular and renal complications.

Despite improvements in diagnosis and treatment, maintaining blood pressure within recommended limits remains difficult for many patients. A large international analysis published in *The Lancet* in 2021 highlighted substantial differences between countries in the detection, treatment, and control of hypertension. These findings emphasise that diagnosing hypertension is only one part of effective care; ensuring sustained control is equally important [1]. The World Health Organization's 2021 guideline also highlighted the importance of appropriate pharmacological treatment and continued follow-up for adults with hypertension [2].

Blood pressure control depends on several factors. These may include age, body weight, dietary salt intake, physical activity, tobacco use, alcohol consumption, coexisting illnesses, duration of hypertension, and adherence to prescribed

treatment. Practical difficulties, such as forgetting medication, treatment costs, limited understanding of the disease, and irregular follow-up, may also interfere with long-term management. However, the contribution of individual factors can differ between patient populations and healthcare settings.

A tertiary care hospital provides an opportunity to examine blood pressure control among patients who seek specialist or advanced medical care. Understanding the proportion of patients whose blood pressure remains above the study's defined target, along with the characteristics associated with poor control, may help identify areas where routine clinical care can be strengthened.

In this context, the present study is designed to assess the prevalence of uncontrolled hypertension among adult patients attending a tertiary care hospital and to examine its association with selected sociodemographic, clinical, and lifestyle factors.

## **AIM AND OBJECTIVES**

### **Aim**

To determine the prevalence of uncontrolled hypertension and assess its associated risk factors among adult patients attending a tertiary care hospital.

### **Objectives**

1. To estimate the prevalence of uncontrolled hypertension among eligible adult patients.
2. To examine the association between blood pressure control and selected sociodemographic characteristics.
3. To assess the relationship between uncontrolled hypertension and clinical factors, including duration of hypertension, comorbidities, and prescribed treatment.
4. To evaluate the association between blood pressure control and selected lifestyle practices and medication adherence.
5. To identify factors independently associated with uncontrolled hypertension, where supported by the collected data and statistical analysis.

## **MATERIALS AND METHODS**

### **Study design and setting**

A hospital-based cross-sectional study will be conducted in the department of medicine at rcs of tertiary care hospital. The study will be carried out over a period of from Jan 2021 to Jan 2022.

### **Study population**

The study population will comprise adult patients with a previously established diagnosis of hypertension who attend the selected hospital during the study period.

### **Inclusion criteria**

- Adults aged 18 years or older.
- Patients with an established diagnosis of hypertension.
- Patients willing to participate and provide informed consent.

### **Exclusion criteria**

Participants may be excluded if they are unable to provide reliable information and no appropriate supporting records are available, or if the study team determines that blood pressure measurement cannot be performed reliably. Any additional exclusions should be specified in the approved study protocol.

### **Sample size and sampling technique**

The required sample size will be calculated using an appropriate formula for estimating a proportion. If the expected prevalence is unknown, a value of 50% may be used to obtain a conservative estimate, with a 95% confidence level and an absolute precision of 5%.

Using these assumptions, the initial sample size is approximately 385 participants. Allowing for 10% incomplete data or non-response gives a target of approximately 423 participants.

This is an illustrative calculation; the final sample size should be confirmed according to the study design, feasibility, and approved protocol. Eligible participants will be recruited consecutively until the required sample size is reached.

### **Data collection procedure**

After obtaining informed consent, information will be collected using a structured data collection form. The form will record relevant demographic details, medical history, lifestyle characteristics, treatment information, and blood pressure measurements.

The following variables may be recorded:

- Age and sex.

- Educational status, occupation, and other relevant socioeconomic characteristics.
- Duration of diagnosed hypertension.
- Current antihypertensive medications and reported medication-taking practices.
- History of diabetes mellitus, kidney disease, cardiovascular disease, or other relevant comorbidities.
- Tobacco use, dietary practices, physical activity, and other lifestyle factors included in the study questionnaire.
- Recent follow-up history and relevant clinical measurements.

Information will be obtained from participant interviews, clinical assessment, and medical records where available. Data collection procedures should be applied consistently to all participants.

### Blood pressure measurement and operational definition

Blood pressure will be measured using a validated and appropriately maintained device. Participants should be seated comfortably and allowed to rest for at least five minutes before measurement. An appropriately sized cuff should be used, and the arm should be supported at heart level. At least two readings should be taken approximately one minute apart, with the protocol specifying how the readings will be summarised for analysis.

For this study, **uncontrolled hypertension** will be defined as systolic blood pressure of 140 mmHg or higher and/or diastolic blood pressure of 90 mmHg or higher at the study assessment among patients with an established diagnosis of hypertension.

This operational definition must be applied consistently and reported clearly. A cross-sectional assessment identifies blood pressure status at the study visit; it does not, by itself, establish persistent poor control over time.

### Study variables

The primary outcome will be uncontrolled hypertension, classified as a binary variable according to the stated blood pressure threshold.

Potential explanatory variables will include age, sex, duration of hypertension, comorbidities, treatment characteristics, medication-taking practices, and lifestyle factors. The final set of variables will depend on the data actually collected and their clinical relevance.

### Statistical analysis

Data will be entered into a suitable statistical software package and checked for completeness and consistency before analysis.

Categorical variables will be summarised using frequencies and percentages. Continuous variables will be described using means and standard deviations when appropriate, or medians and interquartile ranges when distributions are skewed.

The prevalence of uncontrolled hypertension will be reported as a percentage with a 95% confidence interval. Associations between categorical variables and blood pressure control will be examined using the chi-square test or Fisher's exact test, as appropriate. Continuous variables will be compared using suitable statistical tests based on their distribution and study design.

Logistic regression may be used to identify factors independently associated with uncontrolled hypertension. Adjusted odds ratios with 95% confidence intervals will be reported. The variables included in the model should be selected on clinical and statistical grounds, with attention to the number of outcome events and the possibility of confounding. A p-value below 0.05 may be considered statistically significant.

## RESULTS

A total of 100 adult patients with an established diagnosis of hypertension were included in this illustrative example. The analysis describes their sociodemographic and clinical characteristics, the prevalence of uncontrolled hypertension, and the association between selected factors and blood pressure control.

**Table 1. Sociodemographic and Clinical Characteristics of the Study Participants (N = 100)**

| Characteristic                  | Frequency (n) | Percentage (%) |
|---------------------------------|---------------|----------------|
| <b>Age group (years)</b>        |               |                |
| 18–39                           | 20            | 20.0           |
| 40–59                           | 45            | 45.0           |
| ≥60                             | 35            | 35.0           |
| <b>Sex</b>                      |               |                |
| Male                            | 56            | 56.0           |
| Female                          | 44            | 44.0           |
| <b>Duration of hypertension</b> |               |                |
| Less than 5 years               | 42            | 42.0           |
| 5 years or more                 | 58            | 58.0           |
| <b>Comorbidities*</b>           |               |                |

|                                    |            |              |
|------------------------------------|------------|--------------|
| Diabetes mellitus                  | 32         | 32.0         |
| Chronic kidney disease             | 8          | 8.0          |
| Cardiovascular disease             | 15         | 15.0         |
| <b>Medication-taking practices</b> |            |              |
| Regular                            | 68         | 68.0         |
| Irregular                          | 32         | 32.0         |
| <b>Physical activity</b>           |            |              |
| Regular                            | 55         | 55.0         |
| Inadequate                         | 45         | 45.0         |
| <b>Total participants</b>          | <b>100</b> | <b>100.0</b> |

*Illustrative data only. Comorbidities may overlap; percentages therefore need not total 100%.*

In this example, the largest age group was 40–59 years, comprising 45% of participants. Men accounted for 56% of the study population. More than half of the participants (58%) had been diagnosed with hypertension for at least five years. Regular medication-taking practices were reported by 68% of participants, while 45% were classified as having inadequate physical activity.

**Table 2. Prevalence of Uncontrolled Hypertension Among Study Participants (N = 100)**

| Blood pressure status     | Frequency (n) | Percentage (%) |
|---------------------------|---------------|----------------|
| Controlled hypertension   | 62            | 62.0           |
| Uncontrolled hypertension | 38            | 38.0           |
| <b>Total</b>              | <b>100</b>    | <b>100.0</b>   |

*Illustrative data only. Uncontrolled hypertension was defined as systolic blood pressure  $\geq 140$  mmHg and/or diastolic blood pressure  $\geq 90$  mmHg at the study assessment.*

In this hypothetical example, uncontrolled hypertension was observed in 38 of the 100 participants, corresponding to a prevalence of 38.0% (95% confidence interval approximately 29.1%–47.8%). The remaining 62 participants (62.0%) had blood pressure below the specified threshold at the study assessment.

**Table 3. Association Between Selected Factors and Uncontrolled Hypertension**

| Variable                           | Controlled, n (%) | Uncontrolled, n (%) | p-value          |
|------------------------------------|-------------------|---------------------|------------------|
| <b>Age group (years)</b>           |                   |                     | <b>0.201</b>     |
| 18–39                              | 15 (75.0)         | 5 (25.0)            |                  |
| 40–59                              | 29 (64.4)         | 16 (35.6)           |                  |
| $\geq 60$                          | 18 (51.4)         | 17 (48.6)           |                  |
| <b>Sex</b>                         |                   |                     | <b>0.018</b>     |
| Male                               | 29 (51.8)         | 27 (48.2)           |                  |
| Female                             | 33 (75.0)         | 11 (25.0)           |                  |
| <b>Duration of hypertension</b>    |                   |                     | <b>0.038</b>     |
| Less than 5 years                  | 31 (73.8)         | 11 (26.2)           |                  |
| 5 years or more                    | 31 (53.4)         | 27 (46.6)           |                  |
| <b>Medication-taking practices</b> |                   |                     | <b>&lt;0.001</b> |
| Regular                            | 50 (73.5)         | 18 (26.5)           |                  |
| Irregular                          | 12 (37.5)         | 20 (62.5)           |                  |
| <b>Diabetes mellitus</b>           |                   |                     | <b>0.090</b>     |
| Present                            | 16 (50.0)         | 16 (50.0)           |                  |
| Absent                             | 46 (67.6)         | 22 (32.4)           |                  |
| <b>Physical activity</b>           |                   |                     | <b>0.015</b>     |
| Regular                            | 40 (72.7)         | 15 (27.3)           |                  |
| Inadequate                         | 22 (48.9)         | 23 (51.1)           |                  |

*Illustrative data only. Percentages are calculated within each category. P-values are based on illustrative chi-square tests. Statistical significance was defined as  $p < 0.05$ .*

In this illustrative analysis, uncontrolled hypertension was more frequent among participants aged 60 years or older (48.6%) than among those aged 18–39 years (25.0%); however, the overall association between age group and blood pressure control was not statistically significant ( $p = 0.201$ ).

A statistically significant association was observed between sex and blood pressure control ( $p = 0.018$ ), with a higher proportion of uncontrolled hypertension among men than women in this example. Participants with hypertension for five years or longer also had a higher proportion of uncontrolled blood pressure than those with a shorter duration of disease (46.6% versus 26.2%;  $p = 0.038$ ).

Irregular medication-taking practices were associated with a higher proportion of uncontrolled hypertension than regular medication-taking practices (62.5% versus 26.5%;  $p < 0.001$ ). Similarly, uncontrolled hypertension was more frequent among participants with inadequate physical activity than among those reporting regular physical activity (51.1% versus 27.3%;  $p = 0.015$ ). Diabetes mellitus was not significantly associated with blood pressure control in this illustrative analysis ( $p = 0.090$ ).

These findings represent unadjusted associations from the hypothetical example. Multivariable logistic regression using the actual dataset would be needed to assess whether these factors remain independently associated with uncontrolled hypertension after adjustment for potential confounders.

## DISCUSSION

The present study aims to examine an important aspect of routine hypertension care: whether patients with a known diagnosis of hypertension have blood pressure levels within the specified target at the time of assessment. Reporting the prevalence of uncontrolled hypertension may help describe the burden of inadequate blood pressure control in the study setting.

The findings should first be interpreted in relation to the characteristics of the participants and the way blood pressure was measured. Differences in patient selection, age distribution, comorbidities, treatment practices, and the definition of control can influence the prevalence reported by different studies. Therefore, comparisons with published research should be made only after checking that the populations and definitions are reasonably comparable.

The 2021 analysis by NCD-RisC demonstrated considerable international variation in hypertension detection, treatment, and control [1]. This broader evidence provides context for examining blood pressure management at the hospital level, although a single-centre study cannot be assumed to represent the wider population.

Medication-taking practices are an important factor to examine because hypertension often requires long-term treatment and regular review. If the present study identifies an association between reported medication-taking practices and uncontrolled blood pressure, the finding should be interpreted in light of how adherence was assessed and whether other factors were accounted for. An association in a cross-sectional study does not establish that one factor caused the observed blood pressure status.

Lifestyle characteristics and coexisting medical conditions may also be relevant. However, their importance in this particular patient population must be determined from the study data rather than assumed in advance. The discussion should distinguish between factors that were statistically associated with uncontrolled hypertension, factors that remained independently associated after adjustment, and factors for which no significant association was observed.

The practical value of the study will depend on how clearly the findings identify potential gaps in care. Depending on the results, these may relate to follow-up practices, treatment review, patient education, medication-taking difficulties, or the management of associated conditions. Recommendations should be proportionate to the evidence and should not extend beyond what the study can support.

## Strengths and Limitations

A strength of this study is its focus on blood pressure control among patients with an established diagnosis of hypertension in a real-world clinical setting. The collection of demographic, clinical, treatment, and lifestyle information may also help provide a broader understanding of factors associated with control.

Several limitations should be acknowledged. First, the cross-sectional design measures exposure-related information and blood pressure status at approximately the same point in time, limiting conclusions about cause and effect. Second, because participants are recruited from a single tertiary care hospital, the findings may not be generalisable to all people with hypertension in the community. Third, self-reported information about medication-taking practices and lifestyle may be affected by recall or reporting bias. Finally, a blood pressure assessment during one study visit may not fully reflect a participant's usual blood pressure control.

## CONCLUSION

This study is intended to estimate the prevalence of uncontrolled hypertension among adult patients attending a tertiary care hospital and to examine factors associated with inadequate blood pressure control. Once the data have been analysed, the findings may help identify areas where hypertension follow-up and management could be improved. The final conclusion should state the observed prevalence, the factors supported by the statistical analysis, and the implications for clinical practice without overstating the findings.

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