

# Acute and Long-Term Outcomes of Hypertensive Crisis and Hypertensive Emergency in Patients Accompanied by Orthostatic Hypotension

## Abstract

### Introduction

Hypertensive crisis and hypertensive emergency are urgent medical conditions characterized by severely elevated blood pressure levels, often exceeding systolic values of 180 mmHg and/or diastolic values of 120 mmHg. The acute outcomes of hypertensive crisis and hypertensive emergency in patients with orthostatic hypotension include an increased risk of cerebrovascular events, such as ischemic and hemorrhagic strokes, as well as myocardial infarction

**Review of literature:** Orthostatic hypotension has been associated with various adverse outcomes, including syncope, stroke, CVD, and mortality. However, the effects of interventions targeting OH have yet to be extensively reported. It is important to understand the long-term outcomes in individuals with orthostatic hypotension and hypertensive episodes, but not many studies have shed light on this complex clinical scenario. The only literature available focuses on the mortality and morbidity of orthostatic hypotension rather than the outcomes of superimposed hypertensive urgency.

**Discussion:** The study reported secondary outcomes such as readmission rates, in-hospital mortality, stroke, acute kidney injury, and other complications. The study suggests that focusing on preventing orthostatic hypotension symptoms while tolerating some degree of supine hypertension may be a reasonable approach to management.

**Conclusion:** influence the relationship between orthostatic hypotension and hypertensive emergencies. These conditions further complicate the management and outcomes of hypertensive crises and emergencies

### Introduction

Hypertensive crisis and hypertensive emergency are urgent medical conditions characterized by severely elevated blood pressure levels, often exceeding systolic values of 180 mmHg and/or diastolic values of 120 mmHg. These critical situations require immediate management to prevent organ damage and life-threatening complications [1, 2]. Orthostatic hypotension, a

common comorbidity in hypertensive patients, further complicates the management and outcomes of these emergencies.

Orthostatic hypotension is a drop in blood pressure upon standing or changes in body position. It can lead to dizziness, lightheadedness, and syncope [3]. When present alongside a hypertensive crisis or hypertensive emergency, orthostatic hypotension poses additional challenges for clinicians. The incidence of orthostatic hypotension (OH) escalates proportionately with advancing age, as well as in individuals afflicted with disorders impacting autonomic nerve transmission and in those experiencing heightened orthostatic stress. Within the elderly population without underlying medical conditions, the reported prevalence of OH ranges from 5% to 30% [4].

The acute outcomes of hypertensive crisis and hypertensive emergency in patients with orthostatic hypotension include an increased risk of cerebrovascular events, such as ischemic and hemorrhagic strokes, as well as myocardial infarction [5]. Acute kidney injury is also recognized as a potential complication in these patients [6].

Assessing the long-term outcomes of hypertensive crisis and hypertensive emergency in patients accompanied by orthostatic hypotension reveals higher risks for adverse cardiovascular events, including recurrent strokes, heart failure, and cardiovascular-related mortality [7]. Orthostatic hypotension further exacerbates long-term risks and may contribute to falls, fractures, and impaired quality of life [8].

Understanding the acute and long-term outcomes of hypertensive crisis and hypertensive emergency in patients accompanied by orthostatic hypotension is essential for optimizing clinical decision-making, implementing appropriate management strategies, and improving patient outcomes.

## **Methodology:**

I searched PubMed, Scopus, embase , central and web of science to select articles on basis following inclusion and exclusion criteria

### **Inclusion Criteria**

1. Studies published in peer-reviewed journals.
2. Studies investigating hypertensive crisis or hypertensive emergency in patients with orthostatic hypotension.
3. Studies focusing on acute and/or long-term outcomes of hypertensive crisis and hypertensive emergency.
4. Studies involving human participants.

5. Studies reporting relevant outcome measures such as mortality, morbidity, cardiovascular complications, target organ damage, stroke, myocardial infarction, acute kidney injury, or hypertensive encephalopathy.
6. Studies with a clearly defined diagnostic criteria for hypertensive crisis or hypertensive emergency.

#### Exclusion Criteria

1. Studies not published in peer-reviewed journals (e.g., conference abstracts, theses).
2. Studies not directly relevant to hypertensive crisis or hypertensive emergency in patients with orthostatic hypotension.
3. Animal studies or in vitro studies.
4. Studies focused primarily on pediatric populations.
5. Studies with inadequate sample size or insufficient data.
6. Review articles, commentaries, editorials, or case reports.
7. Studies published in languages other than English

## Literature Review

### Conditions Associated with Orthostatic Hypotension

Orthostatic hypotension may affect the management and outcomes of hypertensive crises and emergencies. To explore this relationship, it is important to understand different conditions that coexist with orthostatic hypotension.

#### Autonomic Failure

A recent study by Garland et al. delves into the intricate relationship between autonomic failure, orthostatic hypotension, and blood pressure regulation [9]. The study involved a cohort of patients with autonomic failure characterized by impaired autonomic nervous system function. The researchers found these patients exhibited excessive NO function, contributing to orthostatic hypotension development. The findings of this study are crucial for developing targeted interventions and treatment strategies to improve blood pressure control and mitigate the adverse effects of orthostatic hypotension.

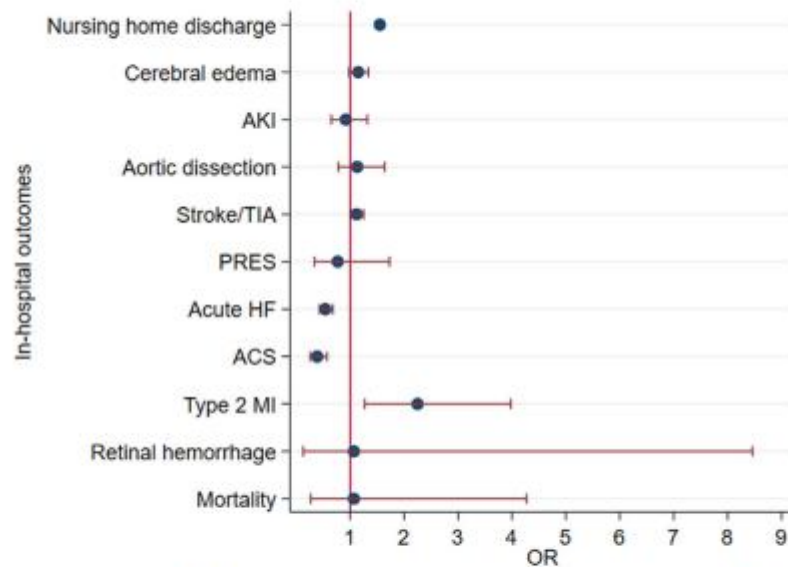
#### Malnutrition and Cognitive Decline

One study by Kocyigit et al. (2019) examined the relationship between frailty and orthostatic hypotension in older adults [10]. They found that frailty was significantly associated with orthostatic hypotension, suggesting that frail individuals may be more susceptible to developing orthostatic hypotension. Gannon et al. (2020) also investigated the cross-sectional association

between diabetes and orthostatic hypotension in community-dwelling older people [11]. Their findings revealed a significant association between diabetes and orthostatic hypotension, highlighting the potential impact of comorbidities on blood pressure regulation. Another study demonstrates a significant association between orthostatic hypotension (OH) and incident dementia [12]. The study found that participants with OH had a higher risk of developing dementia compared to those without OH. Additionally, the study found that the association between OH and dementia was stronger in participants 70 years or older.

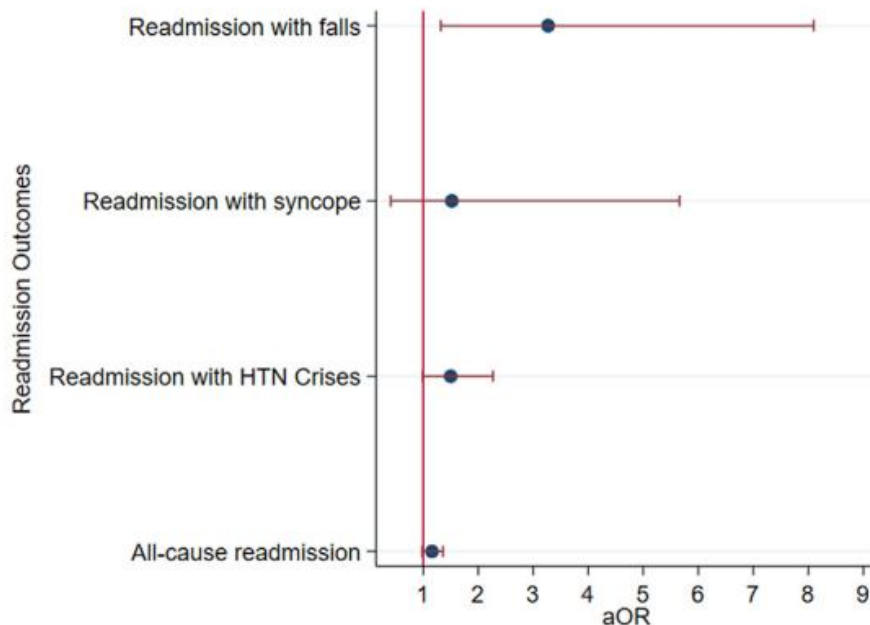
### **Acute Outcomes of Hypertensive Crisis and Hypertensive Emergency in Patients with Orthostatic Hypotension**

Regarding short-term outcomes, a study by Ahmed M. Elzanaty et al. aimed to assess the impact of a certain intervention on binary and continuous outcome variables [13]. The researchers used a standardized mean difference of 5% as a threshold to ensure covariate balance. Chi-square and univariate logistic regression analyses were performed on matched subjects for binary outcomes. The final effect size was reported as the odds ratio for binary variables and mean  $\pm$  SD for continuous variables. The statistical analyses were conducted using StataCorp 17. The study did not provide a detailed summary of the findings or the specific intervention being studied. However, the study did report on several secondary outcomes, including readmission rates, in-hospital mortality, stroke/TIA, acute kidney injury, aortic dissection, posterior reversible encephalopathy, cerebral edema, retinal hemorrhage, acute HF, ACS, and type 2 myocardial infarction.



**FIG 1.** Forest plot showing different in-hospital outcomes of matched cohort. ACS, acute coronary syndrome; AKI, acute kidney injury; HF, heart failure; MI, myocardial infarction; OR, odds ratio; PRES, posterior reversible encephalopathy; TIA, transient ischemic attack. (Color version of figure is available online.)

The OH group was more likely to be readmitted with falls, less likely to suffer from acute HF and ACS, and more likely to have type 2 myocardial infarction. There were no significant differences between the two groups for in-hospital mortality, stroke/TIA, acute kidney injury, aortic dissection, posterior reversible encephalopathy, cerebral edema, or retinal hemorrhage. The study suggests that during the management of these patients, it is reasonable to focus on preventing OH symptoms while tolerating some degree of supine hypertension. Further studies are needed to validate these findings. Therefore, while the specific impact of OH on the severity and management of hypertensive crisis/emergency is not explicitly discussed, the study suggests that it may influence certain outcomes and should be considered in the management approach.



**FIG 2.** Forest plot showing readmission outcomes of matched cohort. (Color version of figure is available online.)

Orthostatic hypotension has been associated with various adverse outcomes, including syncope, stroke, CVD, and mortality. However, the effects of interventions targeting OH have yet to be extensively reported. A 2018 study provides a comprehensive analysis of orthostatic hypotension (OH) and its implications on syncope, stroke, cardiovascular disease (CVD), and mortality [14]. The study explores the relationship between OH and falls, as well as the impact of blood pressure treatment and specific classes of antihypertension agents. The study utilizes a secondary analysis of the trial phase of the AASK study, which focused on black adults with chronic kidney disease attributed to hypertension. The impact of blood pressure treatment on OH was assessed, with a particular emphasis on calcium-channel blockers and angiotensin-converting enzyme inhibitors. The findings of this study indicate that a more intensive blood pressure goal does not cause OH after approximately three minutes. Furthermore, the presence of OH may differ depending on the initial blood pressure medication, although its relationship with CVD effects remains consistent across different medications.

### **Long-Term Outcomes of Hypertensive Crisis and Hypertensive Emergency in Patients with Orthostatic Hypotension**

It is important to understand the long-term outcomes in individuals with orthostatic hypotension and hypertensive episodes, but not many studies have shed light on this complex clinical scenario. The only literature available focuses on the mortality and morbidity of orthostatic hypotension rather than the outcomes of superimposed hypertensive urgency.

The study discussed above is distinctive due to its comprehensive approach to analyzing the implications of OH [14]. By examining the relationship between OH and falls, syncope, stroke, CVD, and mortality, the study provides a holistic understanding of the long-term outcomes associated with OH. Including the AASK study findings adds further depth to the analysis, offering insights into the effects of mean arterial pressure goals and medication therapies on kidney disease progression. However, this article needs a detailed discussion on the mechanisms underlying the relationship between OH and the adverse outcomes examined. While the study provides valuable insights into the associations, further exploring the underlying physiological processes would have strengthened the analysis.

## **Results and Discussion**

Regarding the acute outcomes of hypertensive crisis and hypertensive emergency in patients with orthostatic hypotension, we have included a study that assessed the impact of an intervention on various outcome variables. The study reported secondary outcomes such as readmission rates, in-hospital mortality, stroke, acute kidney injury, and other complications. The study suggests that focusing on preventing orthostatic hypotension symptoms while tolerating some degree of supine hypertension may be a reasonable approach to management.

However, the implications of orthostatic hypotension on long-term outcomes, including syncope, stroke, cardiovascular disease, and mortality, are still unclear. A study analyzed the relationship between orthostatic hypotension and falls and the impact of blood pressure treatment and specific classes of antihypertension agents. The study found that a more intensive blood pressure goal does not cause orthostatic hypotension and that the presence of orthostatic hypotension may differ depending on the initial blood pressure medication.

We acknowledge that limited literature is available on the long-term outcomes of hypertensive crisis and hypertensive emergency in individuals with orthostatic hypotension. The discussed studies provide valuable insights, but further exploring the underlying physiological processes would strengthen the analysis. In short, understanding the acute and long-term outcomes of hypertensive crisis and hypertensive emergency in patients accompanied by orthostatic hypotension is crucial for optimizing clinical decision-making, implementing appropriate management strategies, and improving patient outcomes. Further research in this area is needed to enhance our understanding of the complex clinical scenario and develop targeted interventions to mitigate the adverse effects of orthostatic hypotension.

## **Conclusion**

Various comorbidities, including autonomic failure, frailty, diabetes, and incident dementia, influence the relationship between orthostatic hypotension and hypertensive emergencies. These

conditions further complicate the management and outcomes of hypertensive crises and emergencies. Therefore, targeted interventions and treatment strategies are needed to address the complex interplay between orthostatic hypotension and blood pressure regulation.

While the specific impact of orthostatic hypotension on the severity and management of hypertensive crises and emergencies is not explicitly discussed in the available studies, evidence suggests that orthostatic hypotension may influence certain outcomes. Nonetheless, further research is needed to explore the underlying physiological mechanisms and strengthen our understanding of this complex health condition.

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