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## Review Article

# A Review Article on Orthostatic Hypotension

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### ABSTRACT

Orthostatic hypotension is a physical finding defined by the American Autonomic Society and the American Academy of Neurology as a systolic blood pressure decrease of at least 20 mm Hg or a diastolic blood pressure decrease of at least 10 mm Hg within three minutes of standing. The condition, which may be symptomatic or asymptomatic, is encountered commonly in family medicine. In healthy persons, muscle contraction increases venous return of blood to the heart through one-way valves that prevent blood from pooling in dependent parts of the body. The autonomic nervous system responds to changes in position by constricting veins and arteries and increasing heart rate and cardiac contractility. When these mechanisms are faulty or if the patient is hypovolemic, orthostatic hypotension may occur. In persons with orthostatic hypotension, gravitational opposition to venous return causes a decrease in blood pressure and threatens cerebral ischemia. Several potential causes of orthostatic hypotension include medications; non-neurogenic causes such as impaired venous return, hypovolemia, and cardiac insufficiency; and neurogenic causes such as multisystem atrophy and diabetic neuropathy. Treatment generally is aimed at the underlying cause, and a variety of pharmacologic or non pharmacologic treatments may relieve symptoms.

## INTRODUCTION

Hypotension is a decrease in systemic blood pressure below accepted low values. While there is not an accepted standard hypotensive value, pressures less than 90/60 are recognized as hypotensive. Hypotension is a relatively benign condition that is under-recognized mainly because it is typically asymptomatic. It only becomes a concern once pumping pressure is not sufficient to

perfuse key organs with oxygenated blood. This leads to symptoms impacting the quality of life of a patient. Hypotension is classified based on the biometric parameters of the Blood pressure measurement. It may be absolute with changes in systolic blood pressure to less than 90 mm Hg or mean arterial pressure of less than 65 mm Hg. It may be relative to a decrease in diastolic blood

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pressure to less than 40 mm Hg. It may be orthostatic with a decrease in systolic pressure or 20 mm Hg or greater or a decrease in diastolic pressure of 10 mm Hg or greater on positional change from lying to standing. It may be profound which is defined as being medication- dependent. In acute conditions, the hypotensive shock is a possible and life-threatening condition. Blood pressure is defined as:

- Blood Pressure = Cardiac output x Total peripheral vascular resistance

The mean arterial pressure is an average blood pressure over the course of one cardiac cycle.

It is calculated as:

- Mean arterial pressure =  $\frac{2}{3}$  diastolic pressure +  $\frac{1}{3}$  systolic pressure

#### **Defination:**

Orthostatic hypotension is a drop in blood pressure that occurs when moving from a laying down (supine) position to a standing (upright) position. The word “orthostasis” means to stand up, so the condition is defined as low blood pressure (hypotension) that occurs upon standing. When standing up, gravity moves blood from the upper body to the lower limbs. As a result, there is a temporary reduction in the amount of blood in the upper body for the heart to pump (cardiac output), which decreases blood pressure. Normally, the body quickly counteracts the force of gravity and maintains stable blood pressure and blood flow. In most people, this transient drop in blood pressure goes unnoticed. However, this transient orthostatic oohypotension can cause lightheadedness that may result in falls and injury, particularly in older adults.

#### **Etiology:**

Most studies have investigated as follows;

**classic orthostatic hypotension, and less is known about the delayed**

Following is the list of causes of orthostatic hypotension:

#### **Neurogenic Causes:**

Neurodegenerative diseases – Parkinson disease, Parkinson-plus syndromes.

Peripheral neuropathy – Diabetes, vitamin B12 deficiency, amyloidosis, renal failure, Autoimmune, rheumatological, and paraneoplastic conditions.

#### **Non-Neurogenic Causes:**

Volume depletion – Anemia, dehydration, hemorrhage, hyperglycemia

Cardiovascular diseases – Aortic stenosis, hypertension, atherosclerosis, heart failure, vascular stiffening, or arrhythmias

**Other** – Adrenal insufficiency, physical deconditioning, aging

#### **Epidemiology:**

The prevalence of orthostatic hypotension increases with age. According to the literature, orthostatic hypotension is most prevalent in patients aged 65 years or older, partly due to impaired baroreceptor sensitivity. The prevalence can be as high as 18.2% within that age range. A systematic review and meta-analysis (26 studies, >25 000 people) reported that one in five adults over 60 years old based in the community and four people in long-term residential homes have orthostatic hypotension. Two large population-based studies carried out in the US suggest that orthostatic hypotension is found in less than 5% of people aged 45-49 years, around 15% in those aged between 65 and 69 years, and over 25% in those aged more than 85 years. Orthostatic hypotension is more likely to be prevalent in geriatric inpatients. Clinical settings, frequency of testing, and encouragement to mobilize may affect prevalence in hospitals. Patients with cardiovascular diseases, such as aortic stenosis, pericarditis/myocarditis, or arrhythmias, are also at increased risk for orthostatic hypotension. It can also occur in younger and middle-aged patients, who, in the absence of volume depletion, usually have a chronic autonomic failure.

#### **Pathophysiology:**

There is a pooling of approximately 300 mL to 800 mL of blood in the lower extremities secondary to gravitational forces immediately upon standing from a supine position. This results in decreased venous return to the heart, and as a result, there is a decrease in cardiac output, as defined by the Frank-Starling Curve. The human body normally compensates with an increase in sympathetic tone and a decrease in vagal tone, known as the baroreceptor reflex. This increase in sympathetic outflow raises peripheral vascular resistance, which subsequently increases venous return and cardiac output, thereby limiting the fall in blood pressure. When patients lack this compensatory mechanism, they present with symptoms of orthostatic hypotension.

#### **Clinical Presentation:**

##### **Steady-state circulatory adjustments to the upright posture:**

- Orthostatic stress results in a shift of blood from the chest to the distensible venous capacitance system below the diaphragm.
- This venous pooling rapidly reduces central blood volume, and this reduction is compounded by increased capillary filtration of plasma secondary to the increased hydrostatic pressure in the legs.
- The reduction in central blood volume decreases cardiac filling and stroke volume (the volume pumped by each heartbeat). In healthy individuals, heart rate increases on standing, but not enough to compensate for the reduction in stroke volume, and so cardiac output (the product of stroke volume and heart rate) decreases.
- The key circulatory adjustments to the upright posture (large arrow) are arterial baroreflex-mediated constriction of arterioles and splanchnic venous capacitance vessels, with a subsequent increase in systemic vascular resistance that compensates for the decrease in cardiac output, therefore maintaining

normotension (mean arterial pressure = cardiac output  $\times$  systemic vascular resistance).

##### **Four major subtypes of orthostatic hypotension:**

- Schematics of continuous blood pressure curves showing normal recovery and the diagnostic criteria for initial orthostatic hypotension,<sup>25</sup> delayed blood pressure recovery,<sup>15</sup> classic orthostatic hypotension,<sup>25</sup> and delayed orthostatic hypotension.<sup>25</sup> Because around 95% of patients with orthostatic intolerance and unexplained syncope can be identified as having orthostatic hypotension by systolic blood pressure criteria alone,<sup>26</sup> we display only the systolic blood pressure criteria. Note that a reduction in systolic blood pressure of  $\geq 30$  mm Hg is commonly used to define classic orthostatic hypotension in patients who have supine hypertension.
- In complex cases, further evaluation and autonomic testing may be necessary. In patients presenting with severe symptoms of OH that are not responsive to treatment or with features suggesting major neurogenic component or disruption of autonomic cardiovascular control it may be appropriate to consider a panel of neurological and cardiovascular autonomic tests in consultation with appropriate experts.

##### **Risk factors:**

The risk factors for orthostatic hypotension include:

**Age:** Orthostatic hypotension is common in those who are age 65 and older. Special cells (baroreceptors) near the heart and neck arteries that control blood pressure can slow as you age. It also can be harder for an aging heart to speed up to make up for drops in blood pressure.

**Medications:** These include medications used to treat high blood pressure or heart disease, such as diuretics, alpha blockers, beta blockers, calcium

channel blockers, angiotensin-converting enzyme (ACE) inhibitors and nitrates.

**Certain diseases:** Diseases that can increase the risk of low blood pressure include some heart conditions, such as heart valve problems, heart attack and heart failure. They also include certain nervous system disorders, such as Parkinson's disease. And they include diseases that cause nerve damage (neuropathy), such as diabetes.

**Heat exposure:** Being in a hot environment can cause heavy sweating and possibly dehydration, which can lower blood pressure and trigger orthostatic hypotension.

**Bed rest:** Staying in bed for a long time because of an illness or injury can cause weakness. This can lead to orthostatic hypotension.

**Alcohol:** Drinking alcohol can increase the risk of orthostatic hypotension.

#### **COMPLICATIONS:**

Orthostatic hypotension leads to declining physical function and impaired balance and ability to perform activities of daily living independently.[44] Large meta-analyses reported an increased risk of the following with orthostatic hypotension:

- Heart failure
- Coronary heart disease
- Stroke
- Atrial fibrillation
- All-cause mortality

#### **Treatment:**

##### **Non-pharmacological Treatments for Postural Hypotension:**

- Change position gradually and in phases (from lying to sitting to standing) instead of swiftly.
- Maintain adequate hydration
- Avoid alcohol, warm environments, large meals, and hot showers or baths.
- Sleep with the head of the bed elevated
- Exercise programs
- Cross the legs while standing

- Tense the muscles in the legs and hips after standing
- Lower limb compression
- Abdominal binders

#### **Pharmacological Treatment:**

Pharmacologic treatment should be implemented after a nonpharmacologic intervention has failed to relieve symptoms. According to the literature, fludrocortisone and midodrine remain first-line medications, but many other pharmacologic therapies can be used, including pyridostigmine. Fludrocortisone is an aldosterone analog; midodrine is an alpha-1 agonist, and pyridostigmine is an acetylcholinesterase inhibitor. All of these medications work through different mechanisms to increase vascular tone. In a recent study, midodrine was shown to be more efficacious than pyridostigmine concerning symptomatic relief. Midodrine is indicated only in patients with orthostatic hypotension because of autonomic dysfunction, and its significance for other types of orthostatic hypotension is off-label. Droxidopa is another pharmacological option for treating orthostatic hypotension, but there needs to be more evidence for this drug.

#### **Side effects:**

Possible side effects of drugs for orthostatic hypotension include:

- Numbness.
- Itching.
- Headaches.
- Swelling.
- Heart failure.

#### **Symptoms:**

##### **Common symptoms:**

- Lightheadedness (feeling faint).
- Dizziness (spinning sensation or feeling off-balance).
- Transient loss of consciousness.
- Falls.

##### **Less Common:**

- Blurry vision.
- Visual field deficits.
- Difficulty concentrating.
- Cognitive slowing.

#### Causes:

Orthostatic hypotension causes may include:

- Your heart can't pump as much blood as it should.
- Your autonomic nervous system (which usually brings your blood pressure back to normal) isn't working right.
- You have Parkinson disease, Lewy body dementia or multiple system atrophy.
- You've been lying down a long time (like a pregnant person on bed rest).

#### CONCLUSION:

Orthostatic hypotension is a physical condition characterized by a decrease in systolic blood pressure or diastolic blood pressure within three minutes of standing. It is a common symptom in family medicine and can be asymptomatic or asymptomatic. In healthy individuals, muscle contraction increases venous return to the heart through one-way valves, while the autonomic nervous system responds by constricting veins and arteries and increasing heart rate and cardiac contractility. The condition is characterized by a sustained reduction in systolic blood pressure of at least 20 mmHg or diastolic blood pressure of 10 mmHg within three minutes of standing after being supine for five minutes or at a 60-degree angle on the tilt table. Symptoms on presentation are commonly related to cerebral hypoperfusion, but patients can also be asymptomatic. Early detection in patients with certain risk factors or symptoms may provide better outcomes and prevent complications. Current guidance for detecting and managing orthostatic hypotension is varied and based on inadequate evidence. Primary care providers can play a crucial role in screening and detecting orthostatic hypotension, helping

patients make shared management decisions and improving symptoms and reducing risk.

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