

# Orthostatic Hypotension

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## What is orthostatic hypotension?

Orthostatic hypotension (OH) is defined as a decrease in systolic blood pressure of at least 20mmHg, or a reduction in diastolic blood pressure of at least 10mmHg, upon the change in body position from a supine (lying) to an upright position, regardless of the presence of symptoms.<sup>1</sup> Normally, the nervous system automatically constricts or dilates the blood vessels to balance blood pressure. After a SCI, this ability may become compromised, and orthostatic hypotension may be experienced. Several studies have documented the presence of OH following SCI, particularly during the acute period of injury, but it can persist for many years.<sup>2,3,4,5,6,7,8</sup> Sitting or Standing in physiotherapy is reported to trigger blood pressure decreases that are diagnostic of OH in 74% of SCI patients, and cause symptoms of OH (such as light-headedness or dizziness) in 59% of SCI individuals.<sup>9</sup> Thus, this may discourage individuals with SCI from participating in rehabilitation. Management of OH consists of pharmacological and non-pharmacological interventions.

## What are the risk factors of orthostatic hypotension?

Many factors can contribute to OH. The low level of efferent sympathetic nervous activity and the loss of the reflex vasoconstriction following SCI are the two major causes of OH. Decreases in blood pressure (BP) following the change to an upright position in individuals with SCI may be related to excessive pooling of blood in the abdominal viscera and lower extremities.<sup>5,7,10</sup> Additionally, regular movement of muscles pushes against blood vessels which help guide blood back to the heart. Hence, loss of muscle function in the lower extremities can cause blood to accumulate there. These mechanisms lead to a reduction of blood flow back to the heart and the rest of the body and present as orthostatic hypotension.

Other causes of orthostatic hypotension include low blood volume, low sodium levels in the blood, and deconditioning of the heart and blood vessels from extended bedrest.<sup>5,7,9</sup> Those with a traumatic SCI may also be at a greater risk than those with a non-traumatic SCI (McKinley et al. 1999). The prevalence of OH is greater in patients with higher spinal cord lesions, and thus it is more common in tetraplegia.<sup>7,8,11</sup> Some evidence show that nitric oxide, a chemical that widens the blood vessels, is produced more in SCI individuals.<sup>12</sup> This can result in a further decrease in blood pressure.

## What are the signs and symptoms of orthostatic hypotension?

Orthostatic hypotension may occur with or without the presence of symptoms. Common signs and symptoms include:

- Temporary loss of consciousness
- Fainting
- Dizziness

- Light-headedness
- Fatigue
- Blurry vision
- Muscle weakness

## How do I manage my patients with OH?

Although a wide array of physical and pharmacological measures are recommended for the general management of OH,<sup>13</sup> very few have been evaluated for use in SCI. The general approach to management of OH is that the therapeutic **interventions should be implemented in stages dependent upon the severity of symptoms.**<sup>13</sup> Non-pharmacologic measures alone are often insufficient to prevent symptoms of OH. Pharmacological interventions are often needed, particularly in SCI patients with moderate to severe OH symptoms.

### Pharmacological Options

Only Midodrine (a drug that constricts the blood vessels to bring up blood pressure) has some evidence supporting its use. There is evidence that this drug can elevate blood pressure and improve exercise performance.<sup>14,15</sup> Even so, the use of midodrine should be monitored carefully as 2 males reported urinary bladder dysreflexia with its use.<sup>16</sup>

Unfortunately, the number of studies addressing the pharmacological management of OH following SCI is few. It is often difficult to determine the effects of individual medications when they are used in combination therapies.

### Non-Pharmacological Options

Functional Electrical Stimulation (FES) is one of the only treatments having limited evidence to support efficacy. During functional electrical stimulation, electrical impulses are sent to weak or paralyzed muscles, usually within the legs. This causes muscles to contract and helps move blood back to the heart and around the body. Functional electrical stimulation has been shown to be effective and can be used to supplement other forms of therapy.<sup>17-19</sup> Studies demonstrated that leg muscle contraction by functional electrical stimulation allowed tetraplegics with orthostatic hypotension to stand more often and for longer periods of time.<sup>18-19</sup>

Non-pharmacological options include fluid and salt intake, pressure binders or stockings, whole-body vibration, electrical stimulation, and physical activities. There is currently not enough evidence to support the efficacy of non-pharmacological interventions. Currently, only positive evidence on the effect of fluid and salt intake combined with other pharmacological interventions exist.<sup>8,20</sup>

## For more information:

SCIRE Professional. Orthostatic Hypotension. Available from

<https://scireproject.com/evidence/rehabilitation-evidence/orthostatic-hypotension/>