

Orthostatic Intolerance

Introduction:

Orthostatic intolerance (OI) refers to the development of symptoms when standing that are relieved by lying down. There are many potential causes of OI. Neurally mediated hypotension (NMH), orthostatic hypotension (OH), and postural orthostatic tachycardia syndrome (POTS) are medical terms used to describe several subtypes of OI.

- OH is an abnormal drop in blood pressure (BP) when standing.
 - A BP reduction of at least 20mm Hg systolic, or 10 mm Hg diastolic, within the first 3 minutes of upright posture.
- POTS is an abnormally fast heart rate (tachycardia) response to standing.
 - The reproduction of orthostatic symptoms with a +30 bpm (beat per minute) increase in HR, from supine to 10 minutes upright; or an increase in HR of greater than/equal to 120 bpm. Ages 12-19 heart rate increase must be +40 bpm.
- NMH (also called neurocardiogenic syncope, vasodepressor syncope, vasovagal syncope) refers to sudden fainting while standing.
 - Autonomic signals are not controlling vasculature to appropriately constrict, and BP drops out.

While these physiological phenomena are complex and not fully understood, they occur as a result of failure of the usual neurologic mechanisms that regulate blood vessel, heart rate, and heart contractility responses to changes in position that introduce gravity. This leads to venous pooling in the extremities, decreased venous blood return to the heart and lungs, and a resulting reduction in cardiac output to the brain and body.

Some people experience clinical symptoms with orthostatic challenge, such as dizziness or palpitations (a sensation of increasing heart rate or intensity of each heartbeat), while others may not be acutely aware of symptoms, particularly if their bodies compensate for these deficits.

OI is common in myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), long COVID, is often found in those with connective tissue hypermobility, and can sometimes occur in those with fibromyalgia syndrome (FMS).

Common factors that may cause or worsen OI:

- Prolonged periods of stable upright posture (such as standing in line, washing dishes, or sitting for prolonged periods).
- Being in a warm environment (hot summer weather, a hot crowded room, hot bath or shower).
 - Heat dilates blood vessels in the skin, shunting blood away from the organs and brain, which causes loss of fluid and electrolytes (both, to help facilitate cooling). These combined events may dramatically aggravate OI symptoms.
- Exercise, or suddenly stopping exercise without gradually decreasing activity
- Emotionally stressful events
- Eating (especially after large meals)
- Certain medications (talk with your doctor)

Symptoms:

- Lightheadedness or fainting after standing or squatting
- Palpitations or heart pounding
- Headaches
- Mental confusion including difficulty concentrating, staying on task, paying attention, or finding the right words
- Chest discomfort
- Cold hands and feet
- Chronic fatigue
- AM nausea or vomiting
- Muscle aches

Treatment

Orthostatic intolerance adaptations:

1. Increase daily intake of sodium and water:

- Drink a minimum of 2 liters of water or other fluids (Eight 8-ounce glasses equals about 2 liters. A large soda bottle is 2 liters).
 - Drinking water alone is not sufficient. It is important to match free water intake with sodium intake to prevent rapid removal of free water through urine.
 - Consume a minimum of 2 glasses within the first hour of rising in the morning, 2 glasses before lunch, 1 glass with lunch, 2 glasses in the afternoon, 1 glass with dinner, AND
 - Half of the fluid intake should have added electrolytes (see below).

2. Increase sodium intake:

***Be sure to consult with your medical provider(s) before increasing sodium/fluid intake in the event this is contraindicated for your condition(s).**

Salt (grams)	Sodium (mg)		
1 g	400 mg		
1.25 g	500 mg		
2.3 g	920 mg		
2.5 g	1000 mg		
Fluid (Liters)		Fluid (ounces)	
1 L of fluid		33.8 fl oz	
3 L of fluid		101.4 fl oz	
1 tsp salt = 6 g salt = approx. 2,400 mg sodium = 104 mmol sodium = 104 mEq sodium			

- Salt (NaCl) helps retain fluid in the vascular space to maintain adequate blood volume & pressure.
- Consume 3- 5 grams/3000-5000 mg of NaCl daily (1 tsp salt = 6 gm of NaCl and approximately 2.3 gm/2300 mg of sodium (Na⁺). *Sodium (Na⁺) makes up about 40% of salt (NaCl).*

- Select foods with high sodium content: canned or dry soups, V8 vegetable juice, broths, pickles, and additives such as soy sauce and dressings.
- Supplements are an invaluable tool for consistency:
 - Over-the-counter sodium chloride salt tablets (0.5 – 1 gm) can be used but may produce some stomach upset. ALWAYS take with a meal and *plenty of water*.
 - Electrolyte drinks (e.g., Pedialyte, Liquid IV, Nunn, Drip Drop, LMNT, GatorLyte, Hydromate, or other Oral Rehydration Solutions).
 - Recipe for “homemade” Pedialyte (make your own variations)
 - 1 liter water
 - 1 tablespoon salt
 - 2-3 tablespoons sugar
 - ½ packet Kool-Aid (any flavor) or 1 tbsp Jell-O powder
 - See chart on page 5 for more options.

3. Wear compression clothing

- Wear knee high compression socks at a minimum.
- Combine knee high socks with tight exercise pants/shorts, compression athletic wear, yoga pants, Spanx, or abdominal binders.
- Waist-high medical grade compression stockings.
- These work BEST if put on before getting out of bed and taken off when lying down to sleep.

4. Exercise – reverse deconditioning of the cardiovascular system!

- Often better tolerated when done lying down, recumbent, seated.
- Take advantage of hydrostatic pressure by exercising gently in water.
- Hydrate well beforehand and wear compression clothing during exercise.
- Include strength training + low level cardiovascular exercise regimen.
 - **DO NOT perform without physician guidance if you have been diagnosed with ME/CFS, as exercise CAN WORSEN your overall illness constellation. AVOID PEM!**
 - Cardio:
 - Start with a recumbent bike or swimming for 5 to 10 minutes daily.
 - Transition to upright (challenging gravity) as able.
 - Work up to 30 minutes of exercise if possible.
 - Shorter intervals, combined with rest periods are okay.
 - Light weightlifting or strength training:
 - Focus on resistance training to strengthen leg muscles and abdominal muscles rather than vigorous aerobic training.
 - Avoid heavy lifting or exercising in hot, humid environments.
 - Afternoon exercise may be better tolerated due to better hydration as day progresses.

5. Eat small, but frequent meals:

- Avoid alcohol in general because it causes vasodilation.
- Avoid caffeine.
- Avoid exercise within an hour after a meal.

6. Possible medications to regulate blood pressure and heart rate:

- **Propranolol** is a beta blocker.
 - 10-20 mg two to three times daily (or other betablockers like metoprolol or atenolol)
- **Fludrocortisone** is a drug that encourages retention of salt and water.
 - It is similar to a hormone called aldosterone, made in the adrenal glands.
 - Light potassium supplementation is advisable since sodium is retained as potassium is excreted. The effects are helpful but not always sustained.
- **Midodrine** is a medication that binds to peripheral alpha receptors and increases blood pressure by constricting arterioles (small arteries). It is most helpful used in combination with salt/water loading.
 - The dose range of midodrine is 2.5 to 10 mg three times daily (every 3-4 hours), with the 10 mg being the most effective. It is generally well-tolerated.
 - The most common side effects are tingling or itching in the fingers, toes, and scalp from constricted blood vessels.
 - Dizziness and/or palpitations may be experienced when the dose is wearing off (when the low blood pressure suddenly returns), patients may report these common symptoms about four hours after taking the medication as well.
 - **Note:** It is important to take this medication **only during the upright hours** of the day and not overnight.
 - The last dose should be taken no later than four hours before lying down in bed at night.
 - Blood pressure stabilizes when supine (lying down) and midodrine is not necessary.
 - Contraindications to midodrine are high blood pressure and previous allergic reaction to the medication.
- **Droxidopa (Northera)** is approved for neurogenic orthostatic hypotension. Can be expensive.
- **Pyridostigmine (Mestinon)** is a medication used to treat myasthenia gravis that blocks the enzyme acetylcholinesterase and therefore increases the levels of acetylcholine, a neurotransmitter at the neuromuscular junction and of the autonomic nervous system (especially in the parasympathetic nervous system).
 - Used off-label to treat orthostatic hypotension and POTS.
 - This drug improves venous blood flow return to the heart and delivery of oxygen to cellular tissues.
 - The doses usually range from 30-60 mg every 4-6 hours depending on tolerance and response. There is a 180 mg extended-release version.
 - Common side effects include diarrhea, frequent urination, salivation, and sweating.

7. Maneuvers (as needed) to address worsening symptoms:

- Rapidly drinking two 8-ounce (500 mL) glasses of cold water can help if done before:
 - Prolonged standing is expected (for example shopping).
 - Any circumstance that may produce symptoms (for example: before a walk, exercise, or taking a shower).
- Postural counter-maneuvers can help prevent fainting:
 - Contracting abdominal and buttock muscles for 30 seconds
 - Leg crossing and bending at the waist
 - Raising on toes to constrict calf muscles
 - Isometric contraction of stomach, thigh, and buttock muscle
 - Slow marching in pace
 - Squatting down (but be careful when standing back up)

Rehydration Solution Options					
	Sodium	Potassium	Sugar	Serving Size	Cost Per Serving
Salt Stick Vitassium	215 mg	63 mg	None	1 capsule	0.22¢
Liquid IV Hydration	500 mg	370 mg	11 g	1 packet/500 mL	0.75¢
Nuun SPORT	300 mg	150 mg	1 g	1 tablet/500 mL	0.59¢
Oral Rehydration Salts AGS (WHO Formula) [Normalyte]	851 mg	393 mg	6.75 g (Dextrose)	1 packet/500 mL	1.39\$
Thermotabs	180 mg	15 mg	None	1 tablet	0.09¢
V8 100% Vegetable Juice	940 mg	640 mg	10 g	1 Can (11.5 FL Oz)	0.46¢
V8 +Hydrate	50 mg	150 mg	10 g	1 Can (8 Fl Oz)	0.41¢
Chicken Broth (Progresso)	820 mg	Not Listed	1 g	1 cup (237 mL)	Varies
Vega Sport Electrolyte Hydrator	100 mg	400 mg	N/A	1 scoop	0.68¢
Salt (NaCl)	2300 mg	N/A	N/A	1 tsp Salt	
Normal Saline (IV Fluid)	3600 mg			1 Liter	\$\$\$ & time
LMNT	1000 mg	200 mg	None (Stevia)	1 packet/500 mL +	1.50\$ or Bundle 1.13\$
Re-lyte	810 mg	400 mg	None	1 scoop (4.6 g)	0.67¢
*Cost varies					
**Broth content varies, make sure to check labels					