Peripheral Neuropathy

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Peripheral neuropathy (PN) is becoming a very common comorbidity seen in aquatic physical therapy patients. Peripheral neuropathy, defined by Stino and Smith (1), refers to damage to various components of the peripheral nerve. PN can involve motor, sensory or autonomic nerve fibers depending on cause. Symptoms often are described as numbness and tingling in hands and feet, often progressing proximally into arms and legs. Other symptoms can include burning pain, muscle weakness and gait and balance disorders. Risk factors for PN include diabetes, auto- immune disorders, exposure to toxins, medications (including chemotherapy agents), trauma, infections and other medical conditions. This course will primarily discuss the use of aquatic exercise for treatment of diabetic peripheral neuropathy and chemotherapy induced peripheral neuropathy.

Diabetic peripheral neuropathy (DPN) occurs in almost 50% of individuals with diabetes. In patients with Type 2 diabetes, 20% had peripheral neuropathy present at the time of diabetes diagnosis. There is relatively new research showing a link between obesity, metabolic syndrome and DPN in both Type 1 and Type 2 diabetics. DPN often affects large diameter nerve fibers causing numbness, tingling, aching discomfort, and gait instability (1). Damage to large nerve fibers cause loss of protective sensation against temperature and pain. Symptoms are often in a stocking or glove like pattern causing decreased proprioception and position awareness. Individuals with DPN have altered gait patterns, including decreased gait speed, longer mid-stance time and reduced braking and propelling forces (3). These changes in gait can lead to decreased balance and increased risk of falling.

Chemotherapy induced peripheral neuropathy (CIPN) is a common side effect of chemotherapy treatment in cancer patients. CIPN occurrence can range from 30-60% of cancer patients treated with chemotherapy (4). CIPN symptoms can begin within 30-60 minute of drug administration or occur several weeks or months after chemotherapy treatment has completed (5). Like DPN, CIPN symptoms can include pain, muscle weakness, decreased balance, abnormal gait, diminished reflexes and altered sensations (also in stocking and glove pattern) (4).

Depending on type of drug used, duration of administration and cumulative dose applied, symptoms of CIPN can resolve within a few days or weeks following treatment or may be irreversible (5). Especially in the cases of prolonged symptoms, balance, gait and quality of life can be effected.

In cases of DPN and CIPN, exercise has been shown to be effective in reducing symptoms and improving balance (4-6). Although aquatic exercise was not specifically mentioned in the CIPN studies, several reports utilized aerobic conditioning in the intervention. Aquatic aerobic exercise, especially deep water training, has been shown to improve cancer related fatigue symptoms in breast cancer survivors (7). Due to the buoyant property of water, it would make sense that an individual with PN would be able to tolerate more activity in the aquatic environment due to less gravitational forces through the extremities, causing less discomfort with exercise activities. Despite several article comparing aquatic vs. land based exercise for management of diabetic symptoms, there is minimal research on aquatic vs. land exercise specifically monitoring peripheral neuropathy (8). In the article by Zivi, et al., participants that had aquatic therapy sessions showed better improvement in the Dynamic Gait Index score compared to the land group, but overall had similar effects to the land treatment group.

Due to the benefits of exercise in the treatment of peripheral neuropathy, and the increased frequency of PN as a symptom of diabetes and side effects of chemotherapy, one should consider all possible forms of exercise to improve the gait and balance disorders of these individuals. The aquatic environment allows for improved tolerance to exercise and a medium to allow for progressive balance training to decrease fall risk and improve mobility.

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