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Gravity got you down? Try water!

Defying gravity makes science fiction a therapeutic reality

Putting weight onto a 'bum' knee, forcing heaviness onto a diminished joint or placing a load onto an inflamed nerve, can be problematic and painful for many people. But what if you could avoid Earth's gravitational field? A trip to the moon, which has just 20 percent of our planet's gravity, would be a therapeutic game-changer. An individual weighing 200 pounds would be the equivalent of 40 pounds in space making load and force less of a burden.

Obviously, it's not possible to fly to the moon for therapy. But it's possible to unload body weight here and now on Earth. It's done in water or in the chamber of an anti-gravity treadmill. Getting into a therapeutic pool past shoulder height can unload as much as 90 percent of weight. And with the latest treadmill technology from NASA, you can decrease 80 percent of load and force.

Unloading body weight opens the doors for positive improvement and walking. Some people think it's their torn knee cartilage, worn joint surfaces, an impinged nerve or a host of other maladies that keep them from comfortable and safe movement.

Medical experts know the real culprit is mostly weight and gravity. "The field of biomechanics (the relationship between forces and motion in the body) gives us some interesting information about loads that our weight bearing joints undergo. In the hip and the knee, two joints that are commonly affected by arthritis, joint forces are approximately 1.5 times body weight when walking on level ground. This means that when a person weighing 200 pounds is walking along a level sidewalk, the forces on the joint are the same as for a 300-pound person standing still. Other activities place even greater forces on the joints. Getting up out of a chair increases the force to approximately 2 to 3 times body weight. The same is true of going up and down stairs. With more vigorous activities, such as running or jumping, the forces on the joints can approach 4 to 5 times body weight," noted online by Dr. Carlton Savory from Hughston Health Clinic in Columbus, Georgia.

"Patients don't have to sit on the sidelines and watch their strength, endurance and function decline – there are positive choices to getting them back to reduced pain and their prior level of fitness," says Mindy McCleery, DPT and director of rehabilitation for Orchard Park Rehabilitation Center.

“Many people will opt for surgery to correct what weight and force have done to joints,” she says, but most lower extremity post-surgery protocols come with doctors’ orders for partial weight bearing or weight bearing as tolerated. Recovery is again delayed because most regimens require a healing time period before weight-bearing exercises can comfortably begin,” says McCleery.

Gravity can be an enemy and many people don’t know what kind of force they can safely lean onto their limbs. McCleery says the newer technologies and the therapies that can unload weight takes the guesswork out of each step. “Now we rely on science, not luck, to determine comfortable exercise,” she says.

How the New Technology Works

The latest treadmills operate with differential air pressure (DAP). It’s patented gravity know-how that’s rooted in science. Robert Whalen, a NASA researcher, is founder of the concept using advanced DAP machinery for weight support and the biomechanics of exercise in space.

Whalen’s antigravity field made science fiction more of a reality for the legs of real world users. For patients, it means they can start post-surgical lower extremity therapy earlier than expected because of the ability to offset weight.

Using the new treadmill takes a few steps. Patients don a pair of therapy provided neoprene shorts and step into a flexible air chamber. Being encircled waist high, they are zipped into the pressure tank to create an airtight seal. The machine is than calibrated by a therapist in order to give the appropriate levitation. The chamber inflates and the air pressure inside creates upward lift, floating patients up and off of gravity.

Elements of Anti-Gravity - Aquatic Therapy

Patients who find weight bearing on land difficult due to surgery, pain, loss of balance or a neurological condition will be surrounded by elements of buoyancy and resistance. Submersion in water supports weak muscles and provides resistance to strong muscles. Water is unique in the fact that it’s buoyant but can also provide 600 times more resistance than air. And resistance is multi-directional, which allows balance and strength to improve in all directions.

McCleery reports a breakdown of the latest hydrotherapy benefits new to this area that includes resistance jets used in conjunction with underwater treadmills created by HydroWorx®.

She says the pool is equipped with an underwater video camera and pool deck monitors that allow therapists to instantly give cues to improve gait normalcy. Patients can see each step via the monitor and then practice walking and moving against resistance, while at the same time minimizing the effects of gravity and weight bearing.

Research indicates that warm water coupled with exercise can mitigate the effects of arthritis. Hydrotherapy is an effective way to perform aerobic exercise while not placing too much stress on affected joints. Reports also show that warm water relaxes muscles, improves blood flow to the injured area and leads to an improvement in range of motion.

The increase in stretching ability also comes from the direct water pressure on the extremities to decrease joint swelling and pain. In addition to decreasing pain, the flowing resistance of water has been reported to also increase extremity sensation ability on land.

Orchard Park Rehabilitation Center experts claim that one of the biggest benefits for patients undergoing anti-gravity therapy is the decrease of body weight on joints. Exercising in this way provides a manageable alternative and progresses patients to better movement on land.

The anti-gravity - aquatic therapy difference

"People get a more-comprehensive workout, often strengthening muscles they'd never even have dared to with land exercises," says McCleery and reports that gravity-defying therapy is geared for the following conditions:

- Arthritis and joint pain management
- Cardiovascular training
- Gait analysis
- Musculoskeletal disorders
- Swelling and edema
- Controlling back pain with lumbar stabilization
- Foot, ankle or knee pain
- Short-term therapy with transition to land-based rehabilitation
- Spinal cord injuries
- Amputees
- Stroke
- Brain Injury
- Balance and coordination training

"Sitting out of a fitness regime will set people up for a vicious cycle of inactivity leading to increased weight and more pain," says McCleery. "Let increased activity get you to an improvement of life quality – isn't that what we're all trying to achieve? She recommends all patients seek consult with their physician about the benefits of advanced therapy.