

HYDROTHERAPY IN HAEMOPHILIA

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Exercise is an essential part of a healthy life, which is well supported by research and promoted in national and international guidelines. The benefits of challenging the human body through exercise are well founded by research and extend well beyond the musculoskeletal. Of course, improvements to strength, endurance, flexibility, balance and proprioception (our awareness of where our body is in space) are of great importance, particularly as we age. This allows participation in valued activities and maintaining quality of life and independence throughout life. Often overshadowed, however, are benefits to neuro-immune function, psychological well-being and cardiovascular function which should also be considered as part of the wellbeing cocktail that physical activity can provide.

These benefits are of even greater importance to people with haemophilia. Several modalities (treatment methods) of land-based exercise such as resistance, flexibility and cardiovascular training have demonstrated reduced bleed frequency and severity, improved range of motion and strength during bleed rehabilitation and pain management. However, these land-based modalities often come with an inherent risk of injury and bleed, especially when first commenced. As a result, these exercise forms often require close and ongoing supervision from a healthcare professional with haemophilia experience such as a physiotherapist.

BENEFITS

Hydrotherapy provides a non-land based, low impact exercise option that has many of the above benefits with a significant reduction in bleed risk. International and national guidelines also support the therapeutic benefits of hydrotherapy. Specific benefits demonstrated in the literature include benefits to:

- Elbow, knee and ankle range of motion (ROM)
- Knee flexion and extension strength
- Pain
- And cardiorespiratory function (oxygen uptake, relative



oxygen uptake, carbon dioxide production, heart rate, respiratory quotient, and distance run in Cooper's test - a 12 minute timed running test designed to measure aerobic/cardiovascular capacity).

Most of the programs in the literature consist of 12 x 1 hour sessions over 6 weeks, supervised by a physiotherapist.

The physiological improvements above are attributed to several properties of water.

- **Hydrostatic pressure** is the pressure exerted by a liquid depending on how deep it is, due to gravity. This pressure is about 88.9mmHg at 1.22m deep, which is slightly higher than normal diastolic blood pressure (80mmHg). The circulatory and lymphatic systems are both influenced by this external environmental change. Compression of the superficial vessels promotes lymphatic fluid and blood centrally towards the abdomen and thorax. Increases of central blood volume of up to 60% have been documented in literature as a result of hydrostatic pressure. These processes result in reduced peripheral oedema (swelling), improved cardiac output and improved muscle contraction. Hydrostatic pressure is most effective when in water at least at sternum (breastbone) level.
- **Buoyancy** occurs due to displacement of fluid and acts directly opposite to gravity. When the human body is immersed in water, pressure on joints can decrease by up to 60%. This decreased compressive load through weight-bearing joints enables people with haemophilia to complete activities that may be difficult on land including walking, squatting, jumping and hopping.



- **Water temperatures over 30 degrees Celsius** have been shown to improve muscle contractility, joint movement and can assist with reducing pain.

However, the current evidence is actually quite poor, as highlighted by Nicola Blum's 2015 literature review. This is primarily due to methodological pitfalls including small sample populations, lack of comparison to control populations, poor long-term follow-up and the wide variety of outcome measures used. Some studies also failed to outline their hydrotherapy program, making reproduction impossible. Nevertheless, it is still clinically worthwhile to identify common themes in the literature to guide hydrotherapy programs.

There are several useful resources available online that provide some useful ideas for exercising in water – the article on swimming and haemophilia in the National Hemophilia Federation (USA) magazine *Hemaware* provides a great introduction: <https://hemaware.org/bleeding-disorders-z/swimming-and-hemophilia>. As a general rule, most land-based exercises can be adapted to the hydrotherapy/pool environment with a little creativity. Exploring these movements may allow you to find new ways of completing land exercises. For instance, practicing a step up or squat in a pool provides a much safer environment than on land. The same could be said for practicing heel-toe walking for balance or leg kicks for lower limb strength.

To ensure you are using your time as efficiently and safely as possible, contact your local HTC Physiotherapist for guidance on an individualized hydrotherapy program. ■

REFERENCES

1. American College of Sports Medicine, (2013). Resistance Training for Health and Fitness. [Online] Available at: <https://www.prescriptiontogetactive.com/app/uploads/resistance-training-ACSM.pdf> [Accessed 19 February 2019].
2. Blum N. The effectiveness of aquatic physiotherapy in patients with haemophilia: a review of the literature. *Aqualines* 2015;27(2):5-12. <<https://doi.org/10.1016/j.ctcp.2018.12.004>>
3. Garcia M, et al. Variations of the articular mobility of elbows, knees and ankles in patients with severe haemophilia submitted to free active movimentation in a pool with warm water. *Haemophilia* 2009;15:386-389. <<https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2516.2008.01871.x>>
4. Kargarfard M, Dehghadani M, Ghias R. The effect of aquatic exercise therapy on muscle strength and joint's range of motion in hemophilic patients. *International Journal of Preventative Medicine* 2013;4(1):50–56. <<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3570911>>
5. Mazloun V, Rahmana N, Khayambashi M. Effects of therapeutic exercise and hydrotherapy on pain severity and knee range of motion in patients with hemophilia: a randomized controlled trial. *International Journal of Preventative Medicine* 2014;5(1):83-88. <<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3915478>>
6. Souza J, et al. Haemophilia and exercise. *International Journal of Sports Medicine* 2012;33(2):83-8. <<https://doi.org/10.1055/s-0031-1286292>>