



Arthritis NZ Summer Scholarships Reporting Template

Name of Student

Aliya Mottus

Primary Supervisor's Name

Dr Brendon Roxburgh

Primary Supervisor's Institution

Department of Surgical Sciences, University of Otago, Fourth Floor, Dunedin Public Hospital, 201 Great King Street Dunedin 9016

Project Title

The Effects of Hot Water Immersion on Pain for Those with Mild to Moderate Hip or Knee Osteoarthritis

Statement Regarding Arthritis NZ Sponsorship

I would like to thank the funders of this summer studentship, Arthritis New Zealand, for facilitating me with this opportunity. I want to express my gratitude for your funding and support, this contribution has made a significant impact on my university education and has allowed me to contribute to advancing the knowledge of the effects of hot water immersion for osteoarthritis.

Student's Personal Comment About Study/Experience

My summer research experience has been incredibly rewarding and eye-opening. The opportunity has provided me with invaluable experience, the ability to learn and practice a variety of skills, and an opportunity to understand what it means to go into this field. Not only did I gain valuable insights into the complexities of clinical studies I also witnessed first-hand the positive impact that simple interventions like hydrotherapy can have on patients' lives. I loved the opportunity to work and collaborate with experienced researchers as well as being able to observe the tangible improvements in participant pain levels through our interventions. This experience reinforced my interest in research. Moving forward I hope to continue to engage with this sector as I move forward with an application for a research fellowship in Canada with the University of British Columbia and hopefully in post-graduate study. Overall, this summer has been instrumental in shaping my future aspirations and reaffirming wanting to make a difference in the lives of individuals through research.

Summary of the Project

Osteoarthritis is a condition where bone within a joint becomes damaged (1), leading to pain and reduced mobility; it is the most common form of arthritis in New Zealand affecting 10% of adults (2). Without lifestyle modification, the osteoarthritis usually gets worse over time. Current literature indicates heat therapy, such as heat packs and balneotherapy (3, 4, 5, 6, 7), may provide therapeutic benefits due to the increases in blood flow and elasticity of connective tissues in affected areas (8). However, there is a shortage of research directly investigating hot water immersion's effects on joint pain for those with osteoarthritis.

The purpose of this study was to try and find a way for those with mild-moderate osteoarthritis to decrease their joint pain at home. Specifically, investigating the effects of hot water immersion on joint pain in the 24 hours following exposure. The aim was to find out how much the pain may decrease during each exposure and how long the effects would last. It was hypothesised that 30 minutes of chest deep or lower leg (seated with legs only in water to just below the knee) hot water immersion (40 °C water) would decrease joint pain more than the control condition (i.e., no hot water immersion), both during and following exposure.

Four participants with mild-moderate osteoarthritis were recruited from the Dunedin community, one with hip and three with knee osteoarthritis. The severity of osteoarthritis was determined using the Western Ontario and McMaster Universities Arthritis Index (WOMAC; mild to moderate osteoarthritis was determined by a score of 20 – 40) (9). On average, participants were 58 years old, predominantly female, and not meeting physical activity guidelines. All participants were otherwise healthy with one medicated for hypercholesterolemia.

Once participants entered the hot water their joint pain began to decrease. During the chest deep immersion on average, the joint pain decreased by 1.5 AU (arbitrary units; on a scale of [no pain] 0-10 [worst pain]) from pre-immersion to 30 minutes of immersion. Following immersion joint pain remained lower than pre-immersion for up to six hours. Following the lower leg immersion, participant joint pain decreased by 2 AU from across 30 minutes of bathing. Joint pain remained below pre-immersion levels following bathing until waking the following morning.

Participants had the highest daily step count after lower leg immersion. Participants also completed a questionnaire to provide information on how they found the experience. These results showed that participants felt that the lower leg bathing decreased their pain more than the chest deep immersion and the



control conditions. It also showed that both lower leg and chest deep immersion rated higher than the control condition for feelings of increased joint mobility, mood, and everyday physical activity.

The evidence suggests that chest deep or lower leg bathing, using whatever equipment/facilities are available at home, may provide short term pain relief. This may translate to improved overall wellbeing and increased physical activity levels to help mitigate the progression of osteoarthritis.

References

- (1) Sandmeier, R. H. (2000). Osteoarthritis and exercise: Does increased activity wear out joints?. *The Permanente Journal*, 4(4), 26-8.
- (2) Arthritis NZ. (n.d). *Osteoarthritis*.
<https://www.arthritis.org.nz/osteoarthritis/#:~:text=Osteoarthritis%20is%20the%20most%20common,of%20adults%20in%20New%20Zealand>.
- (3) Skaczkowski, G., Moran, J., Langridge, J., Oataway, K., & Wilson, C. (2018). Effect of a spa bath on patient symptoms in an acute palliative care setting: A pilot study. *Complementary Therapies in Clinical Practice*, 32, 100-102.
- (4) Antonelli, M., Donelli, D., & Fioravanti, A. (2018). Effects of balneotherapy and spa therapy on quality of life of patients with knee osteoarthritis: A systematic review and meta-analysis. *Rheumatology International*, 38(10), 1807-1824.
- (5) Steultjens, M. P., Dekker, J. O. O. S. T., & Bijlsma, J. W. (2001). Coping, pain, and disability in osteoarthritis: A longitudinal study. *The Journal of Rheumatology*, 28(5), 1068-1072.
- (6) Lee, I. M., Shiroma, E. J., Lobelo, F., Puska, P., Blair, S. N., & Katzmarzyk, P. T. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: An analysis of burden of disease and life expectancy. *The Lancet*, 380(9838), 219-229.
- (7) Yildirim, N., Filiz Ulusoy, M., & Bodur, H. (2010). The effect of heat application on pain, stiffness, physical function and quality of life in patients with knee osteoarthritis. *Journal of Clinical Nursing*, 19(7-8), 1113-1120.
- (8) Malanga, G. A., Yan, N., & Stark, J. (2015). Mechanisms and efficacy of heat and cold therapies for musculoskeletal injury. *Postgraduate Medicine*, 127(1), 57-65.
- (9) Bellamy, N., Buchanan, W. W., Goldsmith, C. H., Campbell, J., & Stitt, L. W. (1988). Validation study of WOMAC: A health status instrument for measuring clinically important patient relevant outcomes to antirheumatic drug therapy in patients with osteoarthritis of the hip or knee. *The Journal of Rheumatology*, 15(12), 1833-1840.