Health Benefits of Underwater Treadmill Exercise for Active Adults

Amanda Desmond, Ashley Bayliss, Heather Jacobson, Hillary Hardy, Kristen Jarvey, & Don Bredle PhD
Department of Kinesiology, University of Wisconsin – Eau Claire

ABSTRACT

Purpose: To assess health benefits of hydrotherapy using an underwater treadmill when added to the exercise of adults who are already participating 3 days per week in a university fitness program. We hypothesized that the underwater treadmill would be beneficial for muscle and joint comfort, energy for activities of daily living (ADLs), sleep quality, and well-being in people for whom additional land-based exercise would likely have resulted in overtraining symptoms.

Methods: 14 subjects (81±11 yr) exercised in pairs for 40 min 4 times in a 34°C therapy pool twice weekly for 5 weeks while combining their usual aerobic, strength, and flexibility scores 3 days/week. All had histories of physical ailments. The treadmill was submerged to the thigh level for 20 min walking or jogging at an intensity to elicit a heart rate of 60-60% of heart rate reserve or RPE of 1.6 on a scale of 1-10. Next, 20 min spent up in underwater strength, movement uses, and mechanics of aquatic resistance device. Anthropometrics, strength, flexibility, and the SF-36 Health Survey were assessed at the beginning and end of the program. Questionnaires were completed in each session. Results: Blaming flexibility improved approximately 20% after 5 weeks (<0.05; Figure 2). Fatigue post-exercise dropped from 1.8/10 at the start of the program to 0.5/10 at the end (<0.05). Likewise, muscle or joint pain/soreness 2–4 hrs post-exercise dropped as the program progressed (<0.05). Conclusion: In this small group over this short period, overtraining was avoided and health benefits were apparent as hydrotherapy was successfully added to current exercise prescriptions. The subjects were also overwhelmingly appreciative of the opportunity to try this innovative mode of exercise.

INTRODUCTION

Hydrotherapy is exercise that encompasses a variety of resistance, aerobic, and stretching activities conducted within a heated pool. Numerous studies have shown that engaging in hydrotherapy can result in multiple health benefits that are similar to land based exercise (1). Better water resistance and buoyancy allow for a full range of motion (ROM), which helps to improve balance, stability, and strength and flexibility (2). Thus, hydrotherapy may be indicated for individuals who have balance and postural stability impairments when doing land exercise (3).

Some health benefits that have been attributed to hydrotherapy include lower heart rate (HR) during exercise, decreased joint pain, and decreased muscle soreness. Several studies have indicated, at a given intensity, that HR is lower during underwater exercise than land exercise. It was suggested that the rating of perceived exertion (RPE) should be the standard for measuring intensity during underwater exercise, instead of HR (1).

Hydrotherapy is an innovative way to enjoy exercising with minimal to no pain or injury, especially for people who suffer from arthritis (2,7). Water pressure and temperature play a favorable role in reducing joint pain. Similar to using a hot tub to soothe aching muscles, the warm water temperatures can promote relaxation while also decreasing muscle spasm and stiffness (8). An Australian study done by Rissel and colleagues found that 66% of participants reported decreased stiffness in their most painful joints (2). Individuals participating in underwater treadmill exercise do not need to have previous existing skills or good balance and strength. Thus, the underwater treadmill is especially effective for individuals suffering from hip, leg, or back problems as well as shoulder issues (6).

Aim: To evaluate the impact of adding underwater treadmill exercise (2–3 days/week) to the routine of active adults already doing 3 days/week on land. We hypothesized that this will have measurable health benefits (i.e., flexibility, strength, pain, sleep patterns, completion of activities of daily living (ADLs), and energy levels) without overtraining symptoms.

RESULTS

All 14 subjects expressed enthusiastic appreciation/enjoyment without experiencing adverse effects from the additional 2–3 days/week of exercise. Survey responses showed that they enjoyed the aerobic, strength, and flexibility exercise routine and felt both physically and psychologically: Eleven of 14 subjects reported decreased joint-discomfort, and seven (50%) reported better quality of sleep. In fact, it was likely that only two of the twelve participants (1 male, 1 female) who completed all six sessions of the hydrotherapy-exercise program over the five-week period. As shown in Figure 1, there was a decrease in reported fatigue levels immediately post-exercise, from 1.8/10 at the beginning to 0.5/10 at the end of training (<0.05). Similarly, we found a decrease in muscle and joint movements (1–4). The group average for flexibility improved above 20% after 5 weeks of hydrotherapy (<0.05; Figure 2). Body weight, BMI, grip strength, and resting blood pressure did not change from pre- to post-training.

SUMMARY & CONCLUSIONS

The main finding of the present study was that a program of hydrotherapy exercise was well tolerated, improved flexibility, and tended to reduce muscle and joint pain in a cohort of middle-aged to older adults who had reported a history of orthopedic limitations and musculoskeletal discomfort. Surveys showed substantial decreases in joint pain, muscle soreness, and fatigue following exercise as the training progressed. Limitations may include small sample size, short duration, and having two participants in the cohort simultaneously, which limited the ability to individualize the exercise intensity.

The present study demonstrated that a 5-week hydrotherapy exercise program with an underwater treadmill was successful to increase exercise volume without overtraining problems. This innovative form of exercise appears to be a positive way to improve flexibility, muscle, and joint pain, sleep patterns, and overall quality of life. Hydrotherapy is an enjoyable and sociable mode of exercise which promotes exercise adherence.

REFERENCES


METHODS

Structure physically active men and women were recruited from the University of Wisconsin – Eau Claire Community Fitness Program. All subjects reported a history of physical ailments. Each participant completed the SF-36 quality of life health survey, a Physical Activity Readiness Questionnaire (PAR-Q), and a health history questionnaire. Written informed consent was also obtained.

Baseline and Final Measurements and Documentation

Body mass, height, waist to hip ratio, body fat percent (via skinfold), BMI, blood pressure, resting heart rate, muscular strength, and flexibility were all measured pre and post-training.

Exercise Program

Two days per week combined underwater treadmill and resistance exercises for 5 weeks. The exercise sessions lasted approximately 40 min. 20 min of aerobic underwater treadmill exercise followed by 20 minutes of aquatic resistance training. Subjects walked or jogged on the treadmill at 40–60% of their heart rate reserve or RPE of 3–6 on a 1–10 scale. Subjects then completed one set of 12–15 repetitions for each strength exercise over the course of 20 min. Upper body exercises included elbow flexion and extension, chest and back press, lateral shoulder raise, and chest fly. For the lower body, subjects completed hip abduction, adduction, flexion and extension as well as knee flexion and extension. Heart rate and RPE were recorded every five minutes throughout the entire session.

Quality of Life Surveys

At each exercise session participants completed surveys; documenting muscle and joint pain, changes in flexibility, the ability to perform activities of daily living, energy levels, and overall sleep patterns.

Statistical Analysis

Differences in subject characteristics in response to the exercise program were determined by a paired t-test. Non-parametric tests were used to assess changes in the quality of life surveys over the course of the exercise program. Data are presented as mean ± SD. Statistical significance was set at P < 0.05. Statistical analyses were performed using SPSS software version 17.0 (SPSS Inc.).

ACKNOWLEDGEMENTS

From Dove Healthcare South, we would like to thank Jeff Staats, Aquatic Director, for his time, commitment, and skills. We are also grateful to the HydroWorx pool as well as Jim Deignan, CEO, for encouragement and support. We would also like to thank our subjects for volunteering in the study.