Benefits of an Underwater Treadmill Exercise Program for Non-Exercisers

Justine Lueck, Johnny Miller, Megan Schlough, Matthew Schuette, Abby Zimmerman
Faculty Advisor: Don Bredle, PhD

Department of Kinesiology, University of Wisconsin-Eau Claire

ABSTRACT

Lack of physical activity is a growing problem and continues to affect the health and wellbeing of all Americans. Water exercise with an underwater treadmill is an alternative to land exercise by reducing impact on joints, while maintaining normal gait. The aim of this study is to investigate the effect training in a warm therapy pool has on aerobic endurance, flexibility, strength, balance, and wellbeing. With this study we hope to facilitate the transition from a sedentary to an active lifestyle. For this study eighteen adults who are sedentary, mainly due to orthopedic or obesity issues, were recruited for a 12-week underwater treadmill program. The subjects performed 30 minutes of exercise at a self-selected intensity, 2 days per week. The exercises included walking or jogging, strength, stretching, and hydro-massage. Preliminary results indicate overwhelming appreciation for this mode of exercise, an increase in aerobic capacity as evidenced by an increased treadmill speed, and an increase in daily energy and quality of life. Subjects responded by saying: “my leg felt normal for the first time in six months,” “able to do housework without discomfort,” “able to start running again on dry land without hamstring pain.” We conclude that an underwater treadmill is a successful method for non-exercisers to transition toward an active lifestyle.

INTRODUCTION

- Physical inactivity is recognized as a modifiable risk factor for cardiovascular disease, obesity, cancer, diabetes, osteoporosis, and depression. There is a dose-response relationship between increased physical activity and risk factor improvement which can be demonstrated in individuals beginning regular physical activity and improvement of health.
- Exercising in water has been shown to reduce impact and stress on joints due to the buoyant properties of water.
- Possible improvements include:
  - balance
  - flexibility
  - low back pain and muscle soreness
  - cardiovascular fitness
  - quality of life
- A warm water temperature (93 Fahrenheit) is maintained for comfort during exercise via relaxation of muscle and joint tissue.
- Many people will not attempt typical land-based exercises, or often discontinue them, due to pain or injury. Underwater treadmill training reduces stress on the lower extremities, allowing pain-free exercise and greater exercise adherence.

AIM

The aim of this study is to investigate the effect training in a warm therapy pool has on aerobic endurance, flexibility, strength, balance, and wellbeing on people who are unable or unwilling to exercise. We expect this unique therapy to facilitate their transition from a sedentary to a regularly active lifestyle.

METHODS

- **Subjects**
  - N=18 Caucasian adults (5 male, 13 female)
  - Age range 47-82 years
  - Subjects were sedentary for a minimum of 6 months due to severe arthritis, previous joint replacements, leg amputation and prosthesis, Achilles tendon or hamstring injuries, cancer, obesity, or lifestyle choices (e.g. dislike exercise, lack of time).
  - Subjects were recruited via posters, e-mails, and personal communications throughout the Eau Claire community.
  - Informed consent was obtained for each subject after explanation of the training study.
- **Procedures**
  - Baseline assessments included height, weight, body mass index, waist and hip circumferences, resting heart rate, resting blood pressure, flexibility, range of motion, strength, agility, balance, and aerobic endurance.
  - A 12-week intervention study was implemented in which subjects participated in a 30-minute hydrotherapy exercise program two times per week.
  - Subjects exercised two at a time, with each session led by two student researchers, with the water level set at mid-chest depth.
  - The program consisted of four components: warm up, walking or jogging, resistance training, and cool down. (see Exercise Protocol Table)
  - Treadmill speed and intensity (ankle weights, flow of water from front jets) varied based on the individual’s ability.
  - Surveys assessing pain, energy, quality of sleep, and physical activity levels were distributed every 3 weeks.
  - Underwater cameras (front and side) provided continuous feedback on gait of the exercisers. (see video)

EXERCISE PROTOCOL TABLE

<table>
<thead>
<tr>
<th>Component</th>
<th>Time</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0:00-1:00</td>
<td>Walk Forward</td>
</tr>
<tr>
<td>1</td>
<td>1:01-2:00</td>
<td>Walk Backward</td>
</tr>
<tr>
<td>1</td>
<td>2:01-3:00</td>
<td>Side Step</td>
</tr>
<tr>
<td>1</td>
<td>3:01-4:00</td>
<td>Karaoke</td>
</tr>
<tr>
<td>1</td>
<td>4:01-5:00</td>
<td>High Knees</td>
</tr>
<tr>
<td>2</td>
<td>5:01 - 17:00</td>
<td>Walk or Jog</td>
</tr>
<tr>
<td>3</td>
<td>15:01 - 17:00</td>
<td>Hip Abduction/Adduction</td>
</tr>
<tr>
<td>3</td>
<td>18:01 - 20:00</td>
<td>Hip Flexion/Extension</td>
</tr>
<tr>
<td>3</td>
<td>21:01-23:00</td>
<td>Bicep Curls/Chest Flies</td>
</tr>
<tr>
<td>3</td>
<td>23:01-25:00</td>
<td>Frontal/Lateral Raises</td>
</tr>
<tr>
<td>4</td>
<td>25:01-30:00</td>
<td>Hydro-massage/Stretch</td>
</tr>
</tbody>
</table>

PRELIMINARY RESULTS

- From the onset, all subjects reported overwhelming enjoyment and benefits from beginning exercise in the warm therapy pool.
- After 8 of 12 weeks, 16 of the 18 subjects are still adhering to the training program.
- One subject dropped out due to chronic sinusitis, one for lack of motivation.
- Participants reported improvements in sleep, energy, and accomplishing their activities of daily living.
- Most subjects reported increases in additional physical activity outside of the training study (e.g. walking, cycling, hunting).
- Average speed increased 1.5 MPH and average flow from front jets increased 37%.
- Client #16, an 80-year-old male who had back surgery 3 weeks before our study, stated that his legs and back have finally returned to normal function.
- Client #9, with a history of hamstring injury, was able to increase dry land running to 5 miles.

SUMMARY AND CONCLUSIONS

- After eight weeks of exercise noticeable improvements have been made in fitness, quality of life, and activity levels.
- Reported improvements in activities of daily living such as housework, walking, travel activities, and recreational activities (e.g. hunting, Zumba class, cycling) demonstrate that participants have increased their muscular strength and endurance.
- We conclude that underwater treadmill exercise in a warm therapy pool is an ideal way to transition from no exercise to a regular exercise routine.