Comparing Aquatic Plyometric and Land Plyometric Training on Power and Agility Performance
Brian Fox, Joe Hauser, Benjamin Krings, Chase O’Keefe, Faculty Advisor: Gary P. Van Guilder, PhD.
Department of Kinesiology, University of Wisconsin-Eau Claire

ABSTRACT

Purpose: Plyometric training has been shown to enhance athletic performance in sports that require a high-level of speed, agility, and power. Plyometric training is traditionally performed in a weight room or on a land-based surface, but some evidence indicates that plyometric training underwater may limit the risk of exercise-induced injury without sacrificing performance results. Therefore, the purpose of this study is to compare 4-weeks of aquatic-based plyometric training to a traditional land-based plyometric program with respect to speed, power and agility performance in recreationally active young adults. We hypothesized that both programs will yield similar improvements in power and agility; therefore, aquatic plyometric training may be an effective alternative to traditional land-based plyometric training. Methods: Twenty-two Caucasian subjects participated in this study (age range: 19-23 years; 17 men, 5 women). Subjects were included if they were considered recreationally active according to a health history questionnaire and physical assessments. Procedures: Pre-Testing and Post-Testing included basic health related measures and sport specific variables such as vertical jump, standing broad jump, medicine ball chest pass, T-test, 20 yard shuttle, and 40 yard dash. 10 plyometric training sessions over a four week period lasting 30 to 45 minutes of high intensity exercise.

INTRODUCTION

Traditional land-based plyometric programs are based on quick eccentric to concentric movements, utilizing the stretch reflex to increase force-generating capacity.

Plyometric exercise training is used for its sport specific properties and its favorable effects on various aspects of sport performance, particularly explosive power, speed, and agility.

The ground reaction force distributed throughout the human body has shown to play a large role in joint stress during high impact exercise training, particularly with land-based plyometrics.

On the contrary it is well-known that the inherent properties of water, that is, the buoyancy and density, can be a very useful alternative to land exercise, especially for therapeutic and rehabilitative reasons.

Therefore, aquatic-based plyometrics may be a useful alternative to land-based plyometrics while minimizing joint stress and discomfort.

Currently, there is limited information concerning whether aquatic plyometrics is as good as land-based plyometrics with respect to exercise performance benefits.

EXPERIMENTAL AIM

The aim of the present study was to compare 4-weeks of aquatic-based plyometric training to a traditional land-based plyometric program with respect to speed, power, and agility performance in recreationally active young adults.

METHODS

Subjects

- Twenty-two Caucasian subjects participated in this study (age range: 19-23 years; 17 men, 5 women).

- Subjects were included if they were considered recreationally active according to a health history questionnaire and physical assessments.

RESULTS

I. Subject Characteristics for the entire study population and performance variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Before land plyometrics</th>
<th>After land plyometrics</th>
<th>Before water plyometrics</th>
<th>After water plyometrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>72.2±16.1</td>
<td>72.4±16.3</td>
<td>78.4±15.7</td>
<td>79.3±15.6</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>23±3</td>
<td>23±3</td>
<td>24±4</td>
<td>24±4</td>
</tr>
<tr>
<td>SBP (mmHg)</td>
<td>117±12</td>
<td>115±12</td>
<td>117±8</td>
<td>115±11</td>
</tr>
<tr>
<td>DBP (mmHg)</td>
<td>74±8</td>
<td>71±8</td>
<td>67±4</td>
<td>70±8</td>
</tr>
<tr>
<td>RHR (bpm)</td>
<td>79±20</td>
<td>74±20</td>
<td>69±11</td>
<td>68±10</td>
</tr>
<tr>
<td>Vertical Jump (m)</td>
<td>61.0±15.9</td>
<td>61.1±14.1</td>
<td>61.1±5.1</td>
<td>59.1±5.4</td>
</tr>
<tr>
<td>MB Chest Pass (m)</td>
<td>5.4±0.9</td>
<td>5.7±1.0</td>
<td>5.8±1.1</td>
<td>5.9±1.0</td>
</tr>
<tr>
<td>Broad Jump (m)</td>
<td>2.4±0.3</td>
<td>2.5±0.3</td>
<td>2.3±0.3</td>
<td>2.3±0.2</td>
</tr>
<tr>
<td>40-yd Dash (sec)</td>
<td>5.3±0.5</td>
<td>5.4±0.5</td>
<td>5.5±0.4</td>
<td>5.4±0.4</td>
</tr>
</tbody>
</table>

II. Indication of significant improvements in T-Test and 20 yd. shuttle pre and post land based training. *P<0.05 versus before training.

III. In contrast to land training, there was no significant improvements in T-test and 20 yard shuttle with aquatic based plyometric training.

SUMMARY AND CONCLUSIONS

- Our study has shown that land plyometric training improved T-Test and 20 yard shuttle performance significantly, while also showing a trending improvement in the 40 yard dash.

- Aquatic plyometric training showed a trending increase in 20 yard shuttle, but a decreasing trend in vertical jump and standing broad jump performance.

- We conclude that land based plyometric programs elicit significant improvements in power, speed, and agility compared to a similar aquatic based plyometric program over 4-weeks.

ACKNOWLEDGEMENTS

We would like to thank all of the participants for volunteering in our study and Dr. Gary Van Guilder for his assistance in our research efforts. We would also like to recognize the University of Wisconsin-Eau Claire for the use of facilities, equipment and necessary supplies to complete this study.