

**A critical appraisal of “High-Intensity Interval Training on an
Aquatic Treadmill in Adults with Osteoarthritis: Effect on Pain,
Balance, Function, and Mobility”**

By

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Abstract

This appraisal looks to analyze a research article to determine its clinical significance. The strengths and weaknesses of each section will be addressed to critically appraise the quality of this study. Considering no gold standard currently exists for knee osteoarthritis, it is important to conduct research to aid in discovering the optimal treatment for patients with this condition. As new research is released providing possible treatments, critical appraisals are vital in maintaining credible resources for clinicians to have access to in order to provide valuable treatment to patients.

Key words

Aquatic treadmill
Osteoarthritis
Pain

Introduction

Knee osteoarthritis (OA) has a major impact on quality of life for people with this condition. Many people with knee OA are unable to participate in regular exercise due to pain. According to the study, people who cannot regularly exercise due to knee OA should begin an aquatic exercise program. Mixed results in previous studies are possibly due to lack of control over exercise intensity as well. This study aims to address the lack of control for exercise intensity in this study. This article was chosen to address the clinical question: Does the use of an underwater treadmill benefit adults with knee osteoarthritis in reducing joint pain and improving balance?

Methods

The databases used to find this article were Angelo State University U-Search and PubMed. The keywords used to search for an article to appraise were underwater treadmill, osteoarthritis, and pain. Limitations were placed on the words “horse” and “equine” due to the large amount of articles using similar methods on horses rather than humans. Limitations were used to reduce the search terms to only produce peer reviewed, full text articles, research conducted after the year 2010, and articles written in English. There were no inclusions or exclusions based on participant sociodemographic. After applying limitations on the words “horse” and “equine” in the search for an article, there were only two articles left on the Angelo State University U-Search, and three articles on PubMed. Two of the articles on PubMed were on U-Search as well, resulting in three total articles to choose from.

This article was published in the Journal of Strength and Conditioning Research in 2014. The research was conducted by Eadric Bressel, Jessica E. Wing, Andrew I. Miller, and Dennis G. Dolny in the Biomechanics Laboratory and the John Worley Sports Medicine Research Center at Utah State University. This article was chosen to be clinically appraised because it was the only article that covered all aspects of the clinical question that was presented. The article claimed to be effective in treatment of knee OA and was said to be the first study to incorporate balance as well.

Results

Summary of the study

The study examined the efficacy of using an aquatic treadmill in treatment for knee pain, balance, and mobility. The study was a quasi-experiment with same group of 18 individuals acting as the control and experimental group. The subjects went through a 4-week control which involved no exercise followed by a 6-week aquatic exercise program. The participants were tested for pain levels, balance, and functional mobility after the control period and again after the experimental period. Results showed that the aquatic treadmill was effective in reducing knee pain, improving balance, and improved functional mobility after 6 weeks of training. While statistically significant, only the reduction in joint pain appeared to be clinically significant.

Appraisal of the study introduction

The authors succeeded in clearly discussing the purpose and importance of their study. Background information was given as to how they are improving on previous research. The authors discuss why previous research has been mixed, and how they plan on improving the validity of their research. The literature review consisted of journal articles from credible sources.

The title of the article included dependent variables consisting of pain, balance, function, and mobility. Of these, pain and balance were talked about extensively. Function and mobility were briefly mentioned in a few sentences which did not provide extensive knowledge. A few of the sources looked to be outdated.

Appraisal of the study methods

The study was a 10-week, longitudinal quasi-experiment. Having only one group of participants meant everyone would be a part of the control and experiment. This results in a better comparison of the control to experiment because the same subject performed both. The intervention was clearly stated and visuals were provided. Measurements of the different dependent variables were taken using gold standard tests/ measurement methods. From the data provided, it seemed that the subject pool was similar, except for the weight differences.

The authors mention two different ways they analyzed data that are not commonly used. There were references and an explanation of how one of them worked but not the other. There were only 18 participants in this study. Women made up 16 of the subjects. This could possibly lead to results that are not representative of both sexes. The authors mentioned that adjustments were made during the exercise sessions as needed. They did not state how many subjects needed adjustments and how much of a change the adjustments were. This could result in lower intensity

for some compared to others. This makes the exercise less consistent and intense for participants that needed it.

Appraisal of the study results

The result section was short and concise. The results were given in the same order that the dependent variables were stated in the methods section. The results were easy to follow and conclude if the results were statistically significant. The researchers answered the hypothesis in the result section. The tables are easy to read and clearly state what they are reporting. Any result that has a p value <0.05 is considered statistically significant. The authors gave the percentage differences comparing pre-test and post-test. The table provided shows the mean and SD for each pre-test and post-test measurement. There is a mark next to each measurement that is considered statistically significant.

The authors did not give parameters for clinical significance. Nothing was mentioned about minimal clinically important difference for analyzing data. The text does not provide much insight into the results; the table will raw data was needed to understand the meaning of the results.

Appraisal of the study discussion

The authors discussed how they improved upon previous research. They also re-iterated why having a quasi-experiment backed up the study by showing the subjects saw no improvement during the control period. The conclusion reflects the results, and the clinical benefits that may come from the study. Clinical applications for the results of this study were

discussed as well. The authors stated that aquatic treadmills can be an effective treatment option for patients with knee OA and is best for reducing pain.

The authors spent more time repeating the results rather than discussing the meaning of their findings. The researchers discuss ways to incorporate a true control group into a future experiment, but then dismiss it as not being as reliable as their quasi-experiment. The authors did mention some limitations of the study, such as only having 18 subjects.

Discussion

While this study had several statistically significant findings, the clinical significance is lacking. Pain improvement appeared to be the only result that would carry over into the clinic. Improvements in functional mobility and balance were not enough to be easy to spot without advanced timing and cameras. This study answered all aspects of the clinical question that was presented earlier. However, the majority of the results were not significant enough to warrant change in the clinic.

The potential benefits outweigh the downsides of this intervention method. The subjects did not report any negative effects of the aquatic treadmill. According to the authors, subjects adhered to the 6-week experimental period. This could be the result of exercising in a new way and finally being able to walk with reduced knee pain. Many of the dependent variables resulted in statistically significant improvements. This intervention would be best for reducing knee pain in patients with knee OA; other improvements were minor. The vast majority of clinics do not own aquatic treadmills. Patients would have to find a clinic that offers the services they need. This intervention would be more viable if it was available to larger amounts of clients.

Based on the evidence presented in this study, I would be confident in using this treatment method for future clients. Reducing pain would be the quickest and most improved outcome. Typically, outpatient clinics are the main sites that use aquatic treadmill. Having the opportunity to use an aquatic treadmill with clients would be tough to come by. Since aquatic treadmills are not common in most clinics, a therapist would need to be trained in how to administer the treatments. If available, it seems to be an effective intervention because it can reduce load bearing on the knee joint. This will give the patient the ability to exercise and improve pain, balance, and mobility. The authors stated that all the subjects adhered to the exercise program; this could be due to the fact that most people find the aquatic treadmill to be a new and fun way to exercise.

This critical has addressed the strengths and weaknesses of the research article, “High-Intensity Interval Training on an Aquatic Treadmill in Adults with Osteoarthritis: Effect on Pain, Balance, Function, and Mobility”. Research into treatment options for knee OA is important because there is currently no gold standard for treating this condition. Determining an optimal treatment for knee OA can provide patients with reduced pain and improvements to quality of life. The authors attempted to improve upon previous research by using speed of the aquatic treadmill and jets in the water to help control workout intensity. This study used the same 18 individuals for the control and experimental groups. This helps to prove the effectiveness due to the fact that the same people saw no changes during the control phase. To conclude, the results of this study show promise for aquatic treadmills to be used for treatment of knee OA. Improvement of pain was the only clinically significant result achieved. At this time, aquatic treadmill training is limited due to the lack of clinics that have one. However, if someone with

knee OA has too much pain to participate in load bearing exercise, the aquatic treadmill could be a viable option.

Reference for Article

Bressel E, Wing JE, Miller AI, Dolny DG. High-Intensity Interval Training on an Aquatic Treadmill in Adults with Osteoarthritis: Effect on Pain, Balance, Function, and Mobility. *Journal of Strength & Conditioning Research (Lippincott Williams & Wilkins)*. 2014;28(8):2088-2096. doi:10.1519/JSC.0000000000000258.