A critical appraisal of "Effect of aquatic versus land based exercise programs on physical performance in severely burned patients: a randomized controlled trial"

By

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Abstract

The following is a critical appraisal of the research article “Effect of aquatic versus land-based exercise programs on physical performance in severely burned patients: a randomized controlled trial” in which I will discuss the strengths in weaknesses for each section including the introduction, methods, results, and discussion. What gives this study its strength is its simplicity. The progression of the study is easy to follow, the introduction lays out the foundation of the burn pathologies, their effects, and how aquatics exercise would help by decreasing impact stress. The outcome measures of VO2 max evaluation as a primary outcome and (30-second chair stand test, stair climb test, 30 meters fast-paced walk, time up and go test, and finally a 6-minute walk test) as a secondary outcome are a good indicator of functional strength, The study, however, fails to describe in detail the exact exercises used in each experimental group and neglects to include the exact p values for each outcome measure. In conclusion, I would rate the article a 7/10, it provides a basic foundation for further studies but falls a bit short in the methods.

Keywords: critical appraisal, aquatic, land-based, burn

Introduction

In the age of information, research articles and data are available within a few clicks. With an infinite amount of information flowing around, it is only natural that misleading information is often mixed in. To become a health care professional one must exercise disciplined evidence-based practice to critically appraise each source of information before executing on a patient. I will be critically appraising a research article dealing with the effect of land-based exercises vs aquatics based exercises on physical performance on burn patients to determine if this article is substantial enough to answer my clinical question, "How effective would aquatics therapy be in alleviating a burn patient's pain during therapy?"

Methods

The databases I used were ncbi.nlm,nih.gov, go-gale-com.easydb.angelo.edu, web-b-ebscohost-com.easydb.angelo.edu, and researchgate.net. With all of these databases, I gathered ten hits that were closely related to my clinical question. The main keywords I focused on were burn, aquatics, therapy, and rehab. My search was limited to free articles in English, within 10 years, and the exclusion of reviews and non-experimental articles. I excluded reviews and non-experimental articles to remove articles that might have a personal bias by the authors. I am limited to only English articles due to only having enough mastery to understand scientific articles in English and I limited my search to articles within 10 years to have the most updated information. A personal limit I put on myself is to be wary of the volume number prioritizing higher volume numbers. Prioritizing higher volume journals helps eliminate predatory journals and higher volume journals tend to indicate a reliable heritage.

The study was done in Egypt by the following authors; Ibrahim M. Zoheiry, Ph.D., Haidy N. Ashem, Ph.D., Hamada Ahmed Hamada Ahmed, Ph.D., Rami Abbas, Ph.D. Ibrahim Zoheiry and Haidy Ashem are both from the Department of Surgery at Cairo University, Ahmed Hamada Ahmed is from the Department of Biomechanics in Cairo University and Rami Abbas is from the Department of Physical Therapy in Beirut Arab University. The study was conducted in labs and outpatient clinics of the Faculty of Physical Therapy, Cairo University, and was published by The Journal of Physical Therapy Science in 2017. I chose this article due to it directly involves my clinical question. The study was conducted as a randomized, single-blind, controlled trial. A randomized trial will ensure that one group will not have skewed results due to factors such as gender or age majority. The data gathering was done by a blinded and independent research assistant which will help reduce bias. The groups had similar clinical, sociodemographic, and prognostic characteristics with all forty subjects having severe burn injuries, ages ranging from 20-40 years, and were recruited from several outpatient clinics in Greater Cairo. No subjects dropped out of the study after randomization which means the groups were most likely balanced.

Results

The purpose of this study was the compare the effects of a land-based exercise program to an aquatic-based exercise program on the physical performances of burn patients. Forty subjects aged from 20-40, suffering from severe burns were randomly split into two experimental groups. Group A was trained by the aquatic program while group B was trained by the land-based program. Both programs lasted 12 weeks and focused on endurance, flexibility, and upper and lower body conditioning. After both programs were finished, the subjects were tested

for physical performance via 30 seconds chair stand test, stair climb test, 30 meters fast-paced walk test, time up and go test, 6-minute walk test, and a VO2 max evaluation. Group A showed improvements with all tests such as an increase in the 30 seconds chair stand test, stair climb test, 30 meters fast-paced walk test, 6-minute walk test, VO2 max, and a decrease in the time up and go test compared to group b. In conclusion, the 12-week aquatic exercise program showed better improvements to physical performance for burn patients compared to land-based exercises.

The introduction provides a good baseline of information for burn injuries. These included background on burn injuries such as the effects on the human body, and what will be conducted in the experiment with land-based exercises vs aquatics-based exercises.

The introduction however neglects to speak about the clinical implications of land-based exercises or aquatic exercises.

The strength in the methods of this study is that it was done as a randomized, single-blinded, control trial with forty male participants. All participants were recruited from several outpatient clinics in Greater Cairo who all had chronic severe burns. Being a randomized, single-blinded, control trial allows to further eliminate bias from the experimental results, and gathering the participants from the same area and having the same pathologies allows for a more fair comparison for each experimental group. The outcome measures implemented to test the physical performance of the participants after twelve weeks included VO2 max evaluation as a primary outcome and (30-second chair stand test, stair climb test, 30 meters fast-paced walk, time up and go test, and finally a 6-minute walk test) as secondary outcomes. These outcome measures are good indicators of functional strength.

The weaknesses of this method are the details of actual exercises done on the participants which are described in broad terms. The article only states that "Both types of exercise programs (Table 1) were carried out 3 days per week for 12 weeks. Each session included a 5-minute warm-up, followed by 35 minutes of different types of exercises: flexibility, endurance, and lower and upper body training. Finally, the session ended with a 5-minute cool down" (Zoheiry). This description gives no specific details on exactly what movements/exercises were performed on each experimental group. It is possible that one experimental group received a more effective exercise program, and since no details were given on the exercises, reproducing this experiment would be difficult. If any of these assumptions are true then this would bring the accuracy of the results into question.

The results addressed the research question of "If there a significant difference in physical performance between the two experimental groups of land-based exercise and aquatic exercise for burn patients". The hypothesis has been addressed by showing that there is a statically significant difference between the two experimental groups. The aquatics experimental group showed more improvement compared to the land experimental group. The two tables presented in the results were simple and clear enough to understand with essential data showing the performance of each group of each test before and after treatment. All outcome measures have been reported in the results except for the confidence interval.

The tables although simple and contained most of the needed statistics failed to include the p values. The exact p values were not mentioned in the results and were only assured by the author that the valves for each test were $p<0.05$. Not including these p values forces the reader to backtrack and manually calculate the p values to confirm with the author.

The authors tied the science behind why aquatics was so effective to other studies and references on other studies that used aquatics for stroke patients.

What the discussion lack, however, are the clinical implications of the experiment. The author goes on about the statistically significant difference between the physical performance of the aquatics-based exercise program to the land-based program for burn patients but fails to further address what these results mean for the rehabilitation of these patients and future studies.

Discussion

The significance of this study is to observe better alternative options for treating burn patients. Burn injuries can result in a severe loss of proprioception and increased pain levels especially with shear force to the skin. With this in mind, traditional physical therapy interventions on land could provide discomfort for the patient, and possibly increase fear/anxiety. By learning how aquatic rehabilitation could affect burn patients' physical performance, it could be better utilized as an initial stage of rehabilitation for burn patients before they progress to land exercises. This study compares the physical performance of two experimental groups of burn patients one given a land-based exercise program and one given an aquatics program. My clinical question of how effective is aquatics therapy in alleviating pain for burn patients is directly related to the results of this study. Since the experimental group given the aquatics program performed significantly greater than the group given the land program, it can be inferred that the reason for this difference is due to the aquatics program was more effective in pain management which in turn makes the participants more motivated to exercise.

The intervention was a safe and effective way of determining the effects of aquatics therapy on burn patients. The study had a 0% attrition rate so it can be said that the methods were conducted in a way that did not push the participants past their limits. The only possible risks that come in that is if the patient does not perform well in water due to possible phobias or other underlying pathologies. Overall the benefits greatly outweigh the cons, but the main issue that plagues this study was that the specifics for the exercises were not lined out in detail. If the author showed exactly what exercises each experiment group performed it would help further eliminate the cause of doubt in the study's integrity.

There is strong evidence that aquatics therapy helps alleviate pain and anxiety in patients. Most of the resources in this article are from reputable sources and recent. Due to the safe and light impact of aquatics therapy, there is little to no risk to trying this intervention on possible future patients.

In conclusion, the article provides a solid basic foundation for future studies to further experiment. The introduction provides good baseline information regarding the pathological effects of burns and the reasoning of how aquatics could help. The outcome measures are strong indicators of the progression of the patient's physical performance. The greatest downfall of this study however is that the methods are not easy to replicate. Due to the vague and broad nature of the exercises described for the experimental groups, it is difficult for future studies to elaborate on. The lack of exact p values also interrupts the flow of reading, making the reader backtrack. Overall I would score this study a 7/10, the study provides a decent start for further studies but falls flat on the methods.