

**A critical appraisal of “Effects of Adding Aquatic-to-Land-Based
Physiotherapy Programs for Shoulder Joint Position Sense
Rehabilitation”**

By

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Abstract

This is an appraisal of a 2022 article published in the journal Healthcare and it addresses the effects of the addition of an aquatic-based treatment to a traditional land-based treatment on the joint position sense of the shoulder complex post-injury. A brief introduction to the topic is presented, followed by the clinical question of interest. A methodology is provided as to how this article was found and chosen for appraisal in relation to the clinical question. A summary of the article is compiled in the results section and covers the introduction, methods, results, and discussion of the research article. A discussion regarding the clinical significance and relevance of the findings of the article is presented. Final conclusions are discussed regarding the efficacy of aquatic-treatment on shoulder joint position sense and the justification of its use in a clinical setting.

Key words: Joint position sense, Shoulder, Aquatic-therapy

Introduction

A variety of injuries to the shoulder joint complex results in chronic shoulder pain and instability. The more traditional route to recovery for these symptoms consists of a land-based, strength building training program. Aquatic-based therapy consists of submerging the affected area of a patient and utilizing the physics of water to provide resistance in every plane of movement. Most aquatic-based studies have covered its effects on joints of the lower extremities and more research on the joints of the upper extremities, including the shoulder joint complex is becoming increasingly more available. Based off this information, I formed my clinical question which is: “In patients with chronic shoulder pain/instability, would aquatic-therapy be a more effective treatment in alleviating pain and improving shoulder complex stability compared to a more traditional strength training program?”.

Methods

Searching for articles related to the proposed clinical question began on PubMed and PEDro. Using key words like hydrotherapy, shoulder, instability, and chronic pain, a very limited number of articles were found on PubMed. More results were acquired when using PEDro with the same keywords listed above and any further clarifications provided on search parameters will be specific to the PEDro database system. The search was limited to include clinical trials and exclude systematic reviews. For the purposes of this course and appraisal the results were further narrowed to show only free full articles. Furthermore, any papers that did not focus specifically on the shoulder joint complex were excluded. Taking all this inclusion and exclusion criteria into consideration, a total of 34 articles on the PEDro database were found and reviewed.

Upon review of these articles, three were selected that seemed to best fit into the context of the clinical question of interest. Further review into these articles led to a focus on one titled

“Effects of Adding Aquatic-to-Land-Based Physiotherapy Programs for Shoulder Joint Position Sense Rehabilitation”. This article was led by Dr. Alexandra Camelia Gliga in Targu Mures, Romania. Other contributing authors include Dr’s Nicolae Neagu, Horatiu Popoviciu, and Tiberiu Bataga. It was published in early 2022 by the journal Healthcare. This article was selected for appraisal because of its pertinence to the clinical question of interest. It addresses aquatic-therapy vs. land-based-therapy, shoulder complex stability, and joint position sense.

Results

Summary of the study

This article aims to compare how patients shoulder joint position sense improves after land-based physiotherapy treatment over 4 weeks and what, if any, improvements are made when aquatic therapy is added to an individualized treatment program. Patients undergo inclusion criteria such as having a recent post-traumatic non-operative shoulder condition within the last 5 months, being 20-60 years of age, achieving various shoulder ROM, etc. The subjects were randomly allocated to a control group which underwent 4 weeks, 5 days a week of land-based personalized physiotherapy treatment or to an experimental group undergoing the same duration of land-based treatment but with an additional 30 minutes of aquatic-based therapy at the end of each session. The investigators hypothesized that personalized physiotherapy would improve shoulder joint position sense and that additional aquatic therapy would further improve joint position sense. Their findings showed that no significant difference was seen between the control and experimental groups. However, in general the patients shoulder joint position sense improved with individual physiotherapy treatment.

Appraisal of the study introduction

Overall, the introduction gives a great overview of the topic of the paper. It explains proprioception and how its definition has changed over the years and how it is understood now.

It then goes into more detail on shoulder rehabilitation and proprioception and that there is limited evidence of aquatic-based physical therapy on shoulder proprioception following post-traumatic injury to the joint. They discuss the mechanical effects of water and how they could be used clinically. And finally, this all leads to their hypothesis that aquatic-therapy would increase shoulder joint position sense more than a land-based treatment would by itself. To the best of my knowledge, the references cited in the introduction of this article seem to be from credible and relevant sources.

The introduction could do a better job of giving us a background on information or studies that have been performed in aquatic based treatment of other joints like the knee, hip, ankle, and back. Complete submersion of the shoulder could be a reason why limited information is available as of right now but for the lower extremities that shouldn't be an issue. If there is data available, would they support similar hypotheses that are posed by this article?

Appraisal of the study methods

The selection criteria for participation in this study was well done and narrowed down the population to one that had similar sociodemographic, clinical, and prognostic characteristics. It is also beneficial that it was designed as a randomized controlled trial. This section also provides adequate details on the device used to measure range of motion and the statistical analyses that were performed to observe and make greater sense of the data that was recorded.

Some criticisms formed regarding the methods section is that the subjects of the study and the outcome assessors were not blinded to the group assignment. The replicability of this study is difficult due to the way they designed physical therapy treatment to be individualized to each patient rather than each patient receiving a standard treatment protocol. Another drawback is that the Kinesimeter which was used to measure joint range of motion was designed by the

same group of researchers and no other outside studies were cited regarding the validity and reliability of this device.

Appraisal of the study results

The results section is clear and concise. Data tables are presented here and most of what is written in the results section can be deduced from the data. This can be considered a plus because it means the data is presented in an easy-to-understand way. Most of the data presented is consistent with the hypothesis and aims presented by the article in the introduction. There are two tables that seem like extra info and don't support or contradict the hypothesis. One is a breakdown of participant age and anthropometric characteristics. The other is a distribution of participants according to sex, hand dominance, and post-traumatic condition. This information is helpful in assisting with the reproducibility of the research but is not relevant to the aims of the study or its hypothesis.

The most apparent flaw in the results section is that no units are reported in their data which makes it difficult to interpret initially. The units can be found in the methods section but are only mentioned once. One small change that could be made is to the formatting of the data tables into boxes to better distinguish which values are assigned to which shoulder movement.

Appraisal of the study discussion

The authors mentioned how the results do not support their proposed hypothesis. They explained their rationale as to why they tested flexion, extension, abduction, and internal/external rotations and why other reference studies focused on just flexion and abduction. Almost all the literature used is published recently and from credible sources in the physical therapy field.

Four limitations are listed in this study. First, their design study can't differentiate if the results of the experimental group are due to aquatic therapy or from having longer therapy sessions. Second, lack of a standardized joint position sense assessment test and lack of information on the reliability and validity of the kinesimeter. Third, the COVID pandemic limited the number of participants. Fourth, various post-

traumatic shoulder pathologic backgrounds in the participants makes drawing conclusions for each condition difficult.

Discussion

The findings of this study are clinically relevant in determining the most suitable treatment plan for patients recovering from a recent post-traumatic non-operative shoulder condition and how to best regain strength and stability to the shoulder joint complex. It is most common for a patient to undergo a land-based strength training program with this type of condition. With the use of aquatic-based therapy becoming more well known and popularized it is beneficial to research its effectiveness in comparison to a more traditional treatment program. This study focuses on the comparison of the joint position sense of two groups, one of which received both land-based and aquatic treatment of the affected shoulder and the other group receiving only land-based treatment. In regard to the clinical question, this article directly addresses the effects of aquatic-therapy and its effects on shoulder complex stability. It does not however go into detail on addressing the alleviation of pain in the shoulder joint complex.

The results of this study found that the use of aquatic-therapy had no significant or observable improvement on the joint position sense of the shoulder joint complex. Clinically applied, the use of aquatic-therapy is safe as long as the patient is comfortable in that environment and the progression of recovery from a post-traumatic non-surgical shoulder condition likely won't be delayed due to the use of aquatic-therapy based on this studies finding. However, increased preparation time and facility cost would be two drawbacks to take into consideration for aquatic treatment. Allowing the patient time to dress both before and after treatment and the initial cost for a treatment pool would be high, plus maintenance costs. Taking these factors and the results of the article into consideration it would be more beneficial to continue a traditional land-based strength building treatment program under most circumstances.

The proposed hypothesis of this study was to see if aquatic-therapy was more beneficial in improving shoulder joint position sense for a certain population of patients and based off their findings

they disproved this hypothesis. The design of this study could have been organized in a way that had one group receive only aquatic-therapy rather than a combined treatment of aquatic and land-based therapy. Clinically it would be hard to justify the use of an aquatic-based treatment until further studies are completed to show its effectiveness without a combined land-based treatment. In the case that a clinic has a treatment pool available, and a patient shows interest in trying a similar treatment to that of the study then it would likely not be detrimental to recovery based off the finding of this paper as long as land-based treatment was also implemented.

In conclusion, the use of aquatic-therapy is intriguing and entertaining and provides a unique experience that may be hard for most patients to replicate at home. This study is aware of its limitations and proposes which direction they plan on pursuing for future research. More research is needed to properly determine whether an isolated aquatic-treatment is as effective as an isolated land-based treatment and if it would be beneficial in its use in a clinical setting.