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## REVIEW ARTICLE

### ADVANCING REHABILITATION: CURRENT CONCEPT, LIMITATIONS AND FUTURE TRENDS OF AQUATIC THERAPY IN REHABILITATION - A SCOPING REVIEW

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## ABSTRACT

**Background:** Aquatic therapy, rooted in ancient healing practices, has evolved into an evidence-based rehabilitation method.

**Objectives:** To explore the current concepts, limitations, and future trends of aquatic therapy in rehabilitation.

**Methods:** A scoping review methodology was followed, sourcing data from PUBMED, EBSCO Host, SCOPUS, and Google Scholar. Inclusion criteria involved English-language studies of various designs published until September 2024.

**Results:** Studies show that aquatic therapy benefits individuals with musculoskeletal, neurological, and cardiovascular disorders by improving strength, balance, and psychological well-being. However, limitations include accessibility and a lack of standardized protocols.

**Conclusions:** Aquatic therapy is a promising modality in rehabilitation. Future studies should focus on standardized interventions and explore psychological benefits further.

**KEYWORDS:** Aquatic therapy, water therapy, rehabilitation, systematic review, RCT, physical activity

## INTRODUCTION

The term "aquatic rehabilitation," which dates back to the 20th century, refers to a scientific theory, a medical justification, and a series of clinical techniques that use submersion in water to restore physiological function and physical mobility, as well as rarely to affect psychological change [1]. Patients with musculoskeletal issues, neurological disorders, cardiac pathology, and other ailments benefit from aquatic therapy [2]. Among the tools used in water treatment are swimming suits, belts, carriers, stabilizing devices, heavy objects attached to legs, tension gloves, inflatables, and water tubes. Gait patterning, tail work, facilitation, and also facilitative and opposition force techniques are used [6]. Benefits of aquatic therapy are that [a] for older persons who are unable to bear heavy objects on a particular body area or who have difficulty supporting themselves on the ground, the floating effect is very helpful in aquatic rehabilitation. [b] A body underwater feels the effects of hydrostatic force as well. A body immersed in 4 feet of water experiences hydrostatic force, which is stronger than the typical diastolic blood pressure of about 80 mmHg. The body experiences a further 22.4 mmHg of pressure for each foot underwater. (Becker, 2009). [c] Because



of the raised pressure outside the body, which helps move liquids from the periphery to the central area of the circulatory system, this pressure difference promotes circulation throughout the body. [d] The hydrostatic force can decrease inflammation or swelling by forcing liquid away from the enlarged area of the body. [e] To establish the ideal aquatic therapy environment, a therapist might adjust the temperature of the water [7].

## **MATERIALS AND METHODS**

**STUDY DESIGN:** Scoping Review

**SEARCH STRATEGY:** A systematic search was conducted across 4 electronic databases, namely PUBMED, EBSCO HOST, SCOPUS, and GOOGLE SCHOLAR.

**INCLUSION AND EXCLUSION CRITERIA:** Inclusion criteria encompass scholarly published articles, including systematic reviews, research studies, experimental studies, and surveys published in English. (September 2024). Studies involving participants of all ages and with various medical conditions or impairments were considered. Exclusion criteria involved articles that were written in English, only abstracts, and unpublished articles.

**STUDY SELECTION:** The headlines and introductions of the selected publications were checked by two impartial reviewers for relevance and suitability. A third reviewer was consulted where there was dispute in order to come to a consensus. After that, the entire text evaluation of the studies was conducted, and the grounds for exclusion were recorded.

**DATAEXTRACTION:** Data was taken from the selected research using a standard data extraction form. The following data was gathered:

Title, authors, year in which it was published

Study format and methodology

Population characteristics (e.g., age, medical condition)

Aquatic therapy exercises are used

Rehabilitation interventions and objectives

Outcomes measured (e.g., patient engagement, psychological benefits)

and conclusions



**DATA SYNTHESIS:** The information that was extracted was combined and arranged chronologically according to the primary goals of this scoping review. Studies were grouped based on their areas of interest in enhanced rehabilitation outcomes, patient engagement, and psychological benefits.

**QUALITY ASSESSMENT:** Using the proper instruments, the quality of the research examined was assessed considering the study design. Regarding randomized controlled experiments (RCTs), the mini-mental state examination (MMSE), the Barthel index, and the short form health survey were used. For other study types, observation, interviews, documentation, and questionnaires for observational studies were used. For the experimental study, the Insomnia Rating scale and Pittsburgh Sleep Quality Index (PSQI) scale were used. Two reviewers separately assessed the quality, and disagreements were settled through conversation.

**DATA ANALYSIS:** A narrative synthesis technique was employed to condense and present the results of the included research because of the scope of this evaluation. Findings were synthesized based on the identified thematic categories and discussed in the context of their implications for aquatic therapy in rehabilitation.

## **DISCUSSION**

This is a Scoping Review study that included articles of aquatic therapy, where the studies included various types of water-based exercise in the treatment of patients who have neurological, musculoskeletal, and cardiovascular disorders.

Schinzel E, et al. (2023). The authors conducted a comprehensive literature search across multiple databases that examined the effects of aquatic exercise programs on BMD in individuals aged 60 years and older. After a thorough screening and selection process, the authors included 16 studies (12 RCTs and 4 non-RCTs) involving a total of 1,050 participants in their review. The included studies evaluated various aquatic exercise programs, such as water aerobics, resistance training, and combined programs, with intervention durations ranging from 12 weeks to 24 months. The authors discussed the potential mechanisms underlying the positive effects of water-based exercise on BMD, including the influence of buoyancy and resistance provided by water, as well as the impact on muscle strength and balance, which can indirectly contribute to bone health. Limitations of the review included the heterogeneity in study designs, exercise protocols, and participant characteristics, as well as the potential for publication bias.



Veldema J, et al. (2021). The authors aimed to comprehensively figure out the effectiveness of water-based interventions in the rehabilitation of people after stroke. The authors conducted a thorough literature search across multiple databases, a randomized experiment with control groups that compared aquatic therapy interventions with control conditions or other rehabilitation approaches in post-stroke patients. The studies examined various aquatic therapy modalities, such as aquatic exercises, hydrotherapy, and pool-based therapy programs, administered at different stages of stroke recovery. The meta-analysis quantitatively synthesized the results from the included studies, focusing on outcome measures related to body functions (e.g., balance, gait, muscle strength), everyday routines, and the standard of living. Overall, this systematic review and meta-analysis by Veldema and Jansen provides a comprehensive synthesis of the information currently known regarding water therapy's efficacy in stroke recovery. The findings support the potential benefits of aquatic interventions for improving functional outcomes and promoting recovery in stroke survivors.

Erickson E, et al. Erickson's work focuses on the specific advantages and applications of aquatic therapy for the aging population. The author begins by highlighting the physiological changes associated with aging, including decreased muscle strength, joint flexibility, and cardiovascular function. These changes can lead to a higher risk of falls, functional limitations, and reduced quality of life. Erickson then introduces aquatic therapy as a promising intervention that can mitigate these age-related declines and promote overall well-being. The buoyancy properties of water are discussed in detail, with an emphasis on how they can facilitate exercise and movement for older adults. By synthesizing research findings and practical guidelines, this literature provides valuable insights for healthcare professionals seeking to improve the physical, psychological, and social well-being of their aging clients through the unique properties of water-based interventions.

Becker BE, et al. The author gives a thorough exploration of the scientific principles and clinical applications of aquatic therapy, highlighting its potential as a valuable therapeutic modality in rehabilitation settings. Becker emphasizes the importance of an evidence-based approach to aquatic therapy practice. The author critically reviews the existing literature, highlighting the strengths and limitations of the available research, and provides suggestions for future studies to address gaps in knowledge and establish best practices. Becker discusses practical considerations for implementing aquatic therapy programs, including facility design, safety protocols, and staffing requirements. The author also addresses the role of interdisciplinary collaboration among healthcare professionals, such as physical therapists, occupational therapists, and exercise physiologists, in delivering comprehensive aquatic therapy services. Becker's article provides a



comprehensive and well-researched summary of the scientific foundations and clinical applications of aquatic therapy. By synthesizing theoretical concepts, research evidence, and practical guidelines, this literature serves as a valuable resource for healthcare professionals interested in incorporating aquatic therapy into their practice or seeking to enhance their comprehension of this therapeutic approach.

Cole AJ, et al. (2009) Comprehensive Aquatic Therapy. "Comprehensive Aquatic Therapy" is an extensive textbook that provides a thorough overview of using aquatic therapy for rehabilitation and treatment. The editors have compiled contributions from leading experts in the field to cover the theoretical foundations, practical applications, and evidence behind aquatic therapy interventions. A significant portion of the text is dedicated to addressing specific therapeutic techniques and protocols for aquatic exercise, aquatic therapeutic exercise, bad ragaz, halliwick, ai chi, and other aquatic therapy methods. The authors provide detailed descriptions, instructions, and precautions for each technique, supported by scientific evidence and case studies. The book also covers essential topics related to aquatic therapy practice, such as facility design, water chemistry, risk management, and patient assessment. Additionally, it addresses the role of aquatic therapy in specialized settings, including burn care, cardiopulmonary rehabilitation, and aquatic therapy for individuals with disabilities. Overall, "Comprehensive Aquatic Therapy" provides a comprehensive and well-researched resource for healthcare professionals seeking to incorporate aquatic therapy into their practice. With its extensive coverage of theoretical concepts, practical applications, and evidence-based approaches, this textbook serves as a useful resource for both novice and experienced practitioners in the region of aquatic therapy.

#### **LIMITATIONS:**

Limited high-quality RCTs

Non-uniform intervention protocols

Cost and infrastructure requirements

#### **FUTURE RESEARCH:**

Standardization of treatment protocols

Psychological effects and adherence

Application across varied age groups



## CONCLUSION

Aquatic therapy exercises are useful for the rehabilitation in patients having neurological, musculoskeletal, and cardiovascular conditions.

## REFERENCES

- 1) ColeAJ, Becker BE, editors. Comprehensive aquatic therapy. ButterworthHeinemann; 2004.
- 2) Becker BE. Aquatic therapy: scientific foundations and clinical rehabilitation applications. Pm&r. 2009 Sep 1;1(9):859-72.
- 3) Schinzel E, Kast S, Kohl M, von Stengel S, Jakob F, Kersch-Schindl K, Kladny B, Lange U, Peters S, Thomasius F, Clausen J, Uder M, Kemmler W. The effect of aquatic exercise on bone mineral density in older adults. A systematic review and meta-analysis. Front Physiol. 2023 Mar 13;14:1135663. doi: 10.3389/fphys.2023.1135663. PMID: 36994417; PMCID: PMC10042290
- 4) Veldema J, Jansen P. Aquatic therapy in stroke rehabilitation: systematic review and meta-analysis. Acta Neurol Scand. 2021 Mar;143(3):221-241. doi: 10.1111/ane.13371. Epub 2020 Nov 22. PMID: 33141446
- 5) Pedro Angel Baena-Beato, Manuel Arroyo-Morales, Manuel Delgado-Fernandez, Maria Claudia Gatto-Cardia, Enrique G. Artero, Effects of Different Frequencies (2-3 Days/Week) of Aquatic Therapy Program in Adults with Chronic Low Back Pain. A Non-Randomized Comparison Trial, Pain Medicine, Volume 14, Issue 1, January 2013, Pages 145-158
- 6) Chiquoine J, Martens E, McCauley L, Van Dyke JB. Aquatic therapy. Canine sports medicine and rehabilitation. 2018 Apr 23:208-26.
- 7) Erickson E. The Benefits of Aquatic Therapy for Older Adults.
- 8) Giuriati, S., Servadio, A., Temperoni, G., Curcio, A., Valente, D., & Galeoto, G. (2020). The effect of aquatic physical therapy in patients with stroke: A systematic review and meta-analysis. Topics in Stroke Rehabilitation, 28(1), 19-32.
- 9) Veldema J, Jansen P. Aquatic therapy in stroke rehabilitation: systematic review and meta-analysis. Acta Neurol Scand. 2021 Mar;143(3):221-241. doi: 10.1111/ane.13371. Epub 2020 Nov 22. PMID: 33141446.





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- 10) Perez de la Cruz S. Effectiveness of aquatic therapy for the control of pain and increased functionality in people with Parkinson's disease: a randomized clinical trial. *Eur J Phys Rehabil Med.* 2017 Dec;53(6):825-832. doi: 10.23736/S1973-9087.17.04647-0. Epub 2017 Jun 19. PMID: 28627861.
- 11) Alcalde GE, Fonseca AC, Boscoa TF, Gonçalves MR, Bernardo GC, Pianna B, Camavale BF, Gimenes C, Barrile SR, Arca EA. Effect of aquatic physical therapy on pain perception, functional capacity and quality of life in older people with knee osteoarthritis: study protocol for a randomized controlled trial. *Trials.* 2017 Jul 11;18(1):317. doi: 10.1186/s13063-017-2061-x. PMID: 28697785; PMCID: PMC5504767.
- 12) Li Y, Zheng G. The efficacy of aquatic therapy in stroke rehabilitation: A protocol for systematic review and meta-analysis. *Medicine (Baltimore).* 2021 Dec 3;100(48):e27825. doi: 10.1097/MD.00000000000027825. PMID: 35049184; PMCID: PMC9191287.
- 13) Bei N, Long D, Bei Z, Chen Z, Xing Z. Effect of Water Exercise Therapy on Lower Limb Function Rehabilitation in Hemiplegic Patients with the First Stroke. *Altem Ther Health Med.* 2023 Oct;29(7):429-433. PMID: 37573592.
- 14) Bartels EM, Juhl CB, Christensen R, Hagen KB, Danneskiold-Samsøe B, Dagfinrud H, Lund H. Aquatic exercise for the treatment of knee and hip osteoarthritis. *Cochrane Database Syst Rev.* 2016 Mar 23;3(3):CD005523. doi: 10.1002/14651858.CD005523.pub3. PMID: 27007113; PMCID: PMC9942938.
- 15) Perez-de la Cruz S. Influence of an Aquatic Therapy Program on Perceived Pain, Stress, and Quality of Life in Chronic Stroke Patients: A Randomized Trial. *Int J Environ Res Public Health.* 2020 Jul 3;17(13):4796. doi: 10.3390/ijerph17134796. PMID: 32635281; PMCID: PMC7369960.