

Impact of Aquatic Therapy on Mobility and Quality of Life in Patients with Rheumatoid Arthritis: Systematic Review

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Abstract

Background

Rheumatoid arthritis (RA) is a chronic autoimmune condition that affects approximately 1% of the global population, with higher prevalence among women and in developed countries. Hydrotherapy or water-based exercise—is one of the emerging interventions for patient with RA. The current review is aimed to explore intervention outcomes in a range of aquatic therapy modes, for management of RA patients.

Method

Literature searches were done on PubMed, Cochrane, Google Scholar, Medline, and BioMed Central using the keywords: "hydrotherapy", "physical activity", "rehabilitation", "rheumatoid arthritis", "pain," and "quality of life". Those studies published in English from the year 2019 to 2024, examining the efficacy of hydrotherapy in the management of rheumatoid arthritis symptoms have been included. Data extraction was performed using Microsoft Excel, categorizing information by author, year, design, and findings.

Result

Out of 3180 articles search between 2020-2024, five articles, four being randomized controlled trial and one on the cost effect model of hydrotherapy were included. Cochrane risk of bias tool was used to assess the quality of articles. Results showed all 4 trials indicating the better impact of hydrotherapy as compared to land based exercise on quality of life.

Conclusion

Overall, hydrotherapy has been found to be effective in improving QoL, function mobility and reduction of pain for patients with arthritis; continued research is required to improve treatment protocols and broaden the access.

Keywords

Hydrotherapy, physical activity, rehabilitation, rheumatoid arthritis, pain, and quality of life

Introduction

Rheumatoid arthritis (RA) is a chronic autoimmune condition that affects approximately 1% of the global population, with higher prevalence among women and in developed countries. RA damages joints and causes inflammation. Individuals suffering from RA have pain, stiffness, and functional restrictions which lead to significant disability and impact a person's ability to perform ADLs, leading to a decrease in the quality of life¹. Beyond the physical manifestations, RA patients often experience substantial psychosocial and emotional challenges due to reduced physical capabilities, chronic pain, and the long-term nature of the disease. RA has an extensive impact on patients' daily lives, reducing their ability to participate in social, occupational, and recreational activities and, consequently, diminishing their quality of life. Traditional treatment modalities for RA encompass a wide spectrum, including pharmacological management, physical therapy, lifestyle modifications, and surgical interventions when necessary. However, the limitations and potential side effects of these treatments have driven interest in complementary therapies that provide safe and effective symptom management².

Of all such complementary therapies, aquatic therapy--also called hydrotherapy or water-based exercise--is one of the emerging interventions for patient with RA³. Aquatic therapy has all the very same benefits of exercise on land and then features some added bonus properties thanks to water playing its part as essential in providing therapeutic benefit. Intended to reduce stress on joints with a fuller ROM, more flexibility and easier movement⁴. Aquatic therapy is built on the basic principles from its medium; water (buoyancy, hydrostatic pressure, viscosity and thermal conduction). Some benefits of the body soothed in water, such as buoyancy reducing both jolting and impact-related pain to a large extent are more easily explainable. This property makes it particularly well-suited for RA patients, whose maladies often cause them to be intolerant of the stresses created by conventional, land-based exercise on affected joints⁵.

RA patients who may find exercise in cooler environments or high-impact settings uncomfortable or impractical. These factors make aquatic therapy a uniquely suitable therapeutic option for individuals with RA, who often struggle with conventional weight-bearing exercises that can exacerbate joint pain and inflammation. Aquatic therapy has been proven to influence the functioning of joints, as well as promoting muscle strength and cardiovascular fitness along with an improvement in mental health among patients suffering from arthritis⁶⁻⁷. Water-based exercises programs prepared for the RA population usually contain low-impact activities including walking, stretching and muscular strengthening routines. Aquatic therapy provides a multifaceted and modifiable technique for those living with RA, effectively matching demands across all domains of function in this patient population from easily to moderately or severely affected joints⁸. Additionally, the low-stress water environment enables individuals to perform more high-load movements that they may not otherwise tolerate on

land and enhances confidence in physical activity which fights against sedentarily often seen with chronic disease. Despite these benefits, there is a scarcity of literature on the effects of hydrotherapy particularly on rheumatoid arthritis. The aim of this systematic review was to address the lack of work in understanding mobility and QOL, by systematically assessing current literature on aquatic based therapeutic interventions for RA patients. It aims to explore intervention outcomes in a range of aquatic therapy modes, as well document immediate and longer-terms effects; with potential implications on where this treatment can be incorporated into wider RA management strategies.

Methods

Electronic Databases and Searching Strategies

Literature searches were done on PubMed, Cochrane, Google Scholar, Medline, and BioMed Central using the keywords: "hydrotherapy", "physical activity," "rehabilitation," "rheumatoid arthritis", "pain," and "quality of life," to get the studies that included the effect of hydrotherapy on quality of life of patients with rheumatoid arthritis. Inclusion criteria include research published in the English language from 2020 to 2024, examining the efficacy of hydrotherapy in the management of rheumatoid arthritis symptoms. The studies included in the analysis were based on those that met the inclusion criteria. Those that did not have a control group or condition and the participants who had comorbidities were all excluded in the research study. Studies whose full texts were not available and those published in a non-preferred language were also put out of consideration. Abstraction of data and quality assessment were done based on the inclusion and exclusion criteria under a standard methodology. Information in the study, such as author's name, year of publication, population targeted, and duration of treatment, was extracted and a data mining form prepared, as shown in Table 1. The present study was conducted according to the PRISMA guidelines.

Risk of Bias

The Cochrane tool⁹ was used to assess bias risks for random allocation, allocation concealment, blinding of participants and outcome assessors, incomplete outcome data, and selective reporting.

Data Extraction

Data extraction was performed by two independent researchers using two separate Excel software packages (Microsoft Office Software Suite 2010). One was designated for exercise and depression and the other was for vitamin D supplementation and depression. Extracted data included details such as author names, publication year, study design, age range, sample size, intervention, outcomes and results

Results

In primary search, we found 956 articles based on keywords related to our topic that were “hydrotherapy AND rheumatoid arthritis” from 2023 to 2024. Hence the search strategy was changed and the topic were then search between 2020 till 2024. In the search, we found, 3180 articles related to the above mentioned key words. Out of these articles, 3000 were obtained after excluding the topics. After exclusion of study design, population, and outcome measures, only 5 articles were found to be eligible that were comparing the effects of hydro therapy on quality of life among rheumatoid arthritis patients. The number of initial studies and the detailed process for selecting appropriate studies followed PRISMA guidelines¹⁶ shown in Figure 1.

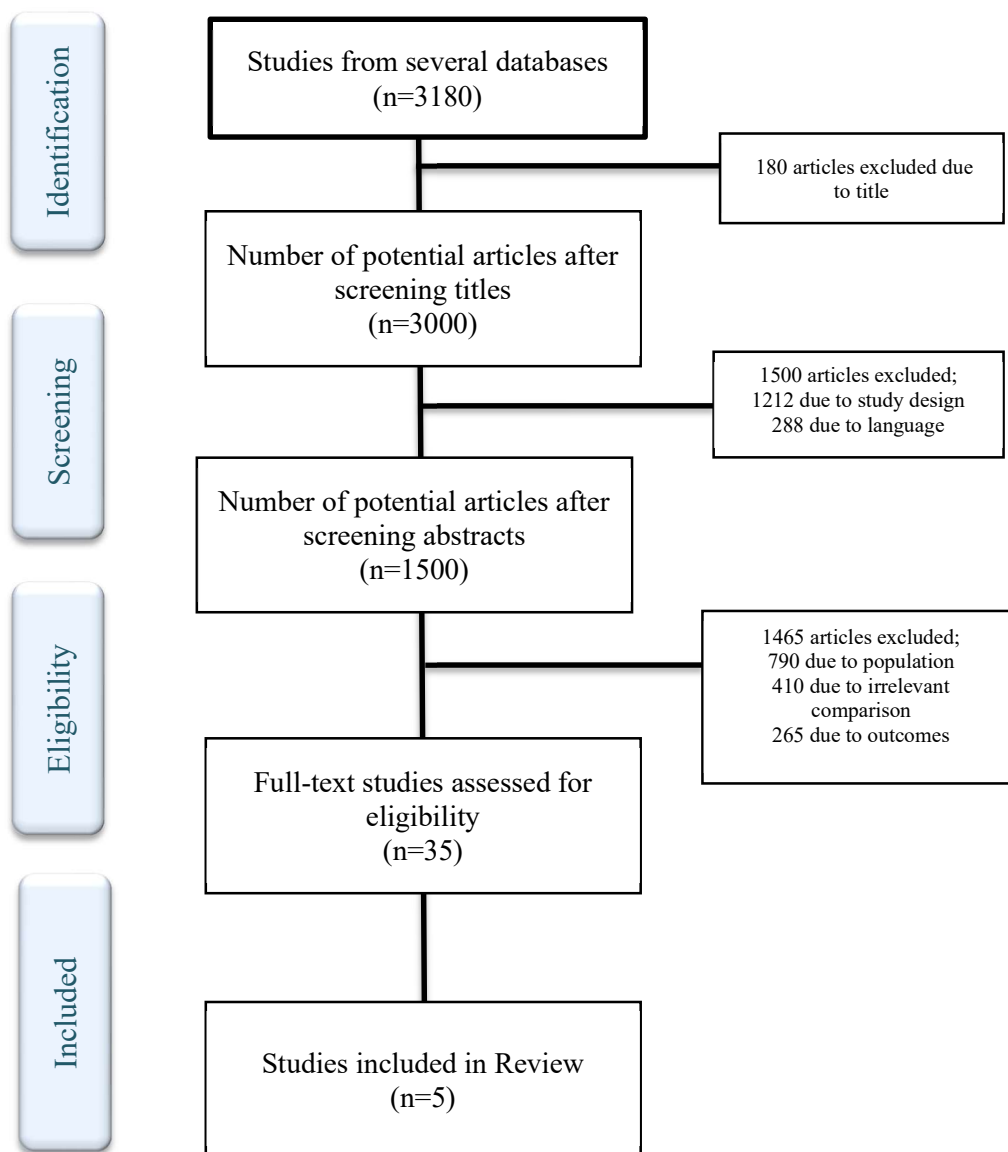


Figure 1 PRISMA flowchart of studies

The characteristics of participants across multiple studies investigating the effects of hydrotherapy on quality of life of patients with rheumatoid arthritis are summarized in Table 1. Each study employed a randomized controlled design with varying age ranges, sample sizes, intervention, and outcomes. Data collection procedures included hydrotherapy that was performed in pool, as nurture therapy along with other modalities and compared with land based exercises.

Table-1 Represents Features of the Included Studies

Author	Design	Age	Target Population	Sample Size	Intervention	Outcome Measure
Shetty et al., 2024 ¹⁰	Randomized controlled trial	18-60 years	Patients with Rheumatoid arthritis	Integrated Naturopathy = 50 Routine Medical Therapy = 50	Patients receive integrated naturopathy for 12 weeks that included Naturopathy Group: Hydrotherapy (11 min), Mud therapy (25-30 min), massage therapy (30 min), and acupuncture (30 min) Routine Medical therapy: received conventional treatment.	The RA disease activity score (DAS-28) ($p = 0.02$), and the majority of the health-related quality of life components (SF 36 scores) all showed a significant decline ($p < 0.05$).
Jinjwaria et al., 2023 ¹¹	Triple blinded randomized controlled trial	17-75 years	Chronic rheumatoid arthritis	Hydrotherapy = 28 Land based Exercise = 26 Control group = 24	Hydrotherapy: Hydrotherapy exercise (30-minutes session for 6 weeks and exercises in a hydrotherapy bathtub submerging body, water temperature (30-35 degrees Celsius). Land based Exercise: 30-minute session for 6 weeks and exercises in land and 11 minutes planned set of an active exercise. Control group: No exercise	At post-test for QoL, the hydrotherapy exercise group showed the maximum response with 67.9% very good and, 21.4% good.
Hassan et al., 2023 ¹²	Randomized controlled trial	3-16 years	Juvenile Idiopathic Arthritis	Experimental group= 30 Control group= 30	Experimental group receive hydrotherapy along with convention physical therapy for 25-30 min as per the guidelines of Arthritis Society Consultation and Therapy Services, Hydrotherapy program. Control group received only conventional physical therapy Both groups performed exercise for 6 weeks (3 days/week)	In children with juvenile idiopathic arthritis, hydrotherapy has the potential to enhance health-related quality of life.

Peres et al., 2023 ¹³	Experimental clinical trial	20-70 years	Rheumatoid arthritis	18 participants	The participants completed a 30-minute cycling exercise based on the research and worldwide guidelines for RA. Following a 15-minute pedaling workout, the recovery cryotherapy was administered while both legs were submerged in waist-deep cold water in an inflatable pool. A constant temperature of 15 ± 0.3 °C was maintained for the water.	The scores of the SF-36 questionnaires showed no significant change.
Nilssen et al., 2020 ¹⁴	Randomized controlled trial	20-35 years	Inflammatory arthritis (rheumatoid arthritis, juvenile idiopathic arthritis, psoriatic arthritis, axial spondyloarthritis and polyarthritis)	Aquatic exercise = 32 No structured rehabilitation = 32	Aquatic exercise + land exercise + patient education 2. No structured rehabilitation (no exercise)	Intervention group significantly improves within group and between the groups for physical functional (30sSTS).

Risk of Bias in Studies

Random Sequence Generation

Four studies¹⁰⁻¹³ showed a low risk of bias as they followed a randomization sequence whereas one study¹⁴ showed high risk of bias.

Allocation Concealment

Four studies¹⁰⁻¹³ showed a low risk of bias except for one study¹⁴ in which concealment was not applicable.

Blinding of Participants and Personnel

Three studies¹⁰⁻¹² considered participant and personnel blinding, one study¹³ did not provide detail and in one

study¹⁴ in which concealment was not applicable.

Blinding of Outcome Assessment

Two studies^{11, 12} showed low risk of bias, two studies^{10, 14} showed an unknown risk of bias, and one study¹⁴ in which concealment was not applicable

Incomplete Outcome Data

All studies¹⁰⁻¹⁴ showed low risk of bias.

Selective Reporting

A low of risk of reporting bias was demonstrated in all five studies¹⁰⁻¹⁴.

Table-2 Assessing Risk of Bias of Included Studies

Author' Year	Random Sequence Generation	Allocation Concealment	Blinding of Participant s and Personnel	Blinding of Outcome Assessment	Incomplete Outcome Data	Reporting Bias
Shetty et al., 2024 ¹⁰	+	+	+	?	+	+
Jinjwaria et al., 2023 ¹¹	+	+	+	+	+	+
Hassan et al., 2023 ¹²	+	+	+	+	+	+
Peres et al., 2023 ¹³	+	+	?	?	+	+
Nilssen et al., 2020 ¹⁴	-	N/A	N/A	N/A	+	+
+ Low Risk of Bias - indicates High Risk of Bias ? Unknown Risk of Bias						

Discussion

The selected studies provide a comprehensive insight into the efficacy of hydrotherapy on quality of life (QoL) for patients with rheumatoid arthritis (RA) and similar inflammatory and musculoskeletal conditions. These five studies, conducted from 2019 to 2024, underscore hydrotherapy's potential as a beneficial intervention in RA management. Although variations exist among the study designs, target populations, and specific interventions used, the overarching results align in demonstrating hydrotherapy's positive impact on improving mobility, reducing pain, and enhancing QoL.

In a randomized controlled trial by Shetty et al. (2024), integrated naturopathy—including hydrotherapy—was evaluated against conventional medical therapy for RA patients aged 18-60. The study demonstrated significant

improvements in disease activity score (DAS-28) and most components of the health-related quality of life (SF-36) in the hydrotherapy group ($p < 0.05$). This result indicates that hydrotherapy, particularly when combined with naturopathic interventions such as mud and massage therapy, can enhance QoL significantly more than standard RA treatment alone. However, the integration of various therapies makes it difficult to isolate the specific contribution of hydrotherapy to these outcomes. This limitation suggests that while multi-modal naturopathy shows promise, future studies should consider separating hydrotherapy to evaluate its direct effects within multi-component interventions. Kumar et al. (2023) conducted a triple-blinded randomized controlled trial comparing hydrotherapy, land-based exercise, and a control group receiving no intervention for chronic RA patients. The study noted that the hydrotherapy group exhibited the most substantial improvement in QoL, with 67.9% of participants reporting a “very good” improvement compared to 21.4% in the land-based exercise group. The positive response of the hydrotherapy group suggests that water-based exercises may offer unique benefits over traditional land exercises by facilitating low-impact movement, reducing joint stress, and supporting muscular engagement. The findings of Kumar et al. further support Shetty et al.'s conclusion that hydrotherapy effectively enhances QoL in RA patients. However, the superior results in Kumar et al.'s study could also reflect the more controlled environment of hydrotherapy, such as the specific water temperature (30–35°C) used to maximize muscle relaxation, which could be an essential factor contributing to pain relief and QoL improvements. Similar results were reported on the effects of hydrotherapy in other arthritic conditions. As in a meta-analysis and systematic review conducted in 2024 on efficacy of hydrotherapy among osteoarthritic patients. A total of six randomized controlled trial were included which showed the significant decrease of pain intensity between hydrotherapy and land based exercise group with mean difference of (WMD=−0.724; 95% CI: −1.099 to −0.348, $P < 0.001$) post 8 weeks of intervention¹. In another study conducted in 2024 on women with osteoarthritis. It was shown that hydrotherapy showed slightly improved result as compared to conventional physical therapy on pain and muscle strength of women². Additionally, a 2024 review article assessed how well hydrokinesiotherapy improved knee OA patients' pain, joint mobility, quality of life, and physical function when compared to self-administered exercise regimens and traditional land-based physical therapy. In every study, hydrokinesiotherapy continuously showed better results in terms of joint mobility, physical function, and pain reduction. Significant improvements in pain and movement were observed by patients in the hydrokinesiotherapy groups, and these benefits were closely linked to improved quality of life. The research also emphasized how hydrokinesiotherapy may be a useful supplement or substitute for land-based exercise, especially for those with severe symptoms³.

Hassan et al. (2023) studied the effects of hydrotherapy on QoL in a younger population (children with juvenile idiopathic arthritis -JIA), through random controlled trial, and showed that those who had been treated with water therapy experiences more improvement comparing to control group, hence promoted idea for beneficial effect across age ranges. Furthermore, the utilization of hydrotherapy for JIA demonstrates its versatility and feasibility in other populations [and across age ranges—RA as well as other inflammatory arthritis]. In particular, Hassan et al. This research highlights how hydrotherapy can contribute to improved function and psychosocial aspects for young people with arthritis-related disabilities, which should be considered in future early intervention strategies within pediatric rheumatology.

Nilssen et al. conducted a randomized controlled trial to compare the efficacy of aquatic exercise versus land-based exercise and no structured rehabilitation. There were significant improvements in physical function for the intervention group, particularly with the use of a 30-Second Sit-to-Stand (30sSTS) test. These findings indicate a beneficial effect of hydrotherapy that reaches beyond RA to other inflammatory undifferentiated joint disorders. Moreover, the between-group differences suggesting an advantage of nurturing environment in

aquatic therapy over no exercise/rehabilitation indicate that arthritis patients should move to some activity and support use of water-based therapy when high-impact activities are contraindicated by acute pain or joint instability.

In addition to assessing the clinical outcomes of hydrotherapy, Teng et al. 2019, analyzed with an economic view by creating a decision-analytic model to evaluate whether or not hydrotherapy is cost-effective compared to land-based therapy for certain MSDs (Rheumatoid Arthritis – RA -, osteoarthritis and post-operative recovery). The model indicated that hydrotherapy was a cost-effective option compared to land-based therapy with an incremental cost-effectiveness ratio (ICER) of SGD 27,471 per quality-adjusted life year (QALY). The findings of this economic evaluation are important as the financial viability represents a key determinant in whether hydrotherapy interventions can be interpreted to widespread use. While hydrotherapy tends to be more expensive (due in part, and somewhat counterintuitively, as we shall discuss later) due to its requirement for specialised facilities and trained staff than many others included within Teng et al.'s model, elasticity appears to still make it a sensible economic choice; and with the long-term benefits of patient mobility and less reliance on pharmaceutical pain management seems like an appropriate conditioning intervention.

Therefore all these studies together highlight the clinical and psychosocial benefits provided by hydrotherapy in arthritis related conditions—from RA to juvenile idiopathic arthritis, as well as other inflammatory group. Nevertheless, although most studies report clinically meaningful improvements in QoL and functional outcomes this comes with some caveats. Firstly, the varied interventions encompassing single-modality hydrotherapy to multi-component naturopathy and patient target populations make straightforward homogenisation of hydrotherapeutic protocols challenging. Moreover, financial and logistical constraints further limit the access of many patients to formal hydrotherapy due in part to lack of availability in such facilities for lower income or rural areas

Conclusion

Overall, hydrotherapy has been found to be effective in improving QoL, function mobility and reduction of pain for patients with arthritis; continued research is required to improve treatment protocols and broaden the access milieu. Further research should work towards defining hydrotherapy interventions for, but not limited to RA and similar populations and extracting particular effects accurately in order to obtain the best outcomes within a more sustainable healthcare model.

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Conflict of Interest

The Authors declare that there is no conflict of interest.

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