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Review study on hydrotherapy and AQUA therapy in spine disorders

Dan Ionuţ PÎRJOL[1], Dan MONEA[2], Mihaela ORAVIŢAN[3], Nicolae Adrian JURJIU[4]

Abstract

Introduction: Hydrotherapy is a common comfort measure, treatment and care intervention-and it is a therapy prescribed in several clinical specialties for soothing and health-promoting qualities.
Aim: Through this study, we aimed to analyze as many articles as possible on the topic of hydrotherapy as a spine ailments recovery method. At the same time, we wanted to follow what kind of recovery programs or exercises have been performed with patients in the water and which of them have given the best results.
Material and method: We searched and analyzed articles published in the 2011-2022 period, using the Google Scholar search engine and databases such as Science Direct, PubMed and Research Gate. Initially, we selected a total of 65 articles, of which, following the use of exclusion criteria, we were left with a number of 10 articles.
Results: It was observed that hydrotherapy or exercises performed in water have multiple beneficial effects on the human body, especially in people suffering from various diseases of the lumbar spine.
Conclusions: We conclude that hydrotherapy is a beneficial treatment method in the rehabilitation of various spine conditions, both used independently and in association with other accessible treatment methods.

Keywords: *hydrotherapy, spine, deficiencies, water exercises*

Rezumat

Introducere: Hidroterapia este o măsură de confort comună, o intervenţie de tratament şi de îngrijire şi este o terapie prescrisă în mai multe specialităţi clinice pentru calităţile de calmare şi de promovare a sănătăţii.
Scop: Prin acest studiu, ne-am propus să analizăm cât mai multe articole pe tema hidroterapiei ca metodă de recuperare a afecţiunilor coloanei vertebrale. Totodată, am dorit să urmărim ce fel de programe sau exerciţii de recuperare au fost realizate cu pacienţii în apă şi care dintre ele au dat cele mai bune rezultate.
Material şi metodă: Am căutat şi analizat articole publicate în perioada 2011-2022, folosind motorul de căutare Google Scholar şi baze de date precum Science Direct, Pubmed şi Research Gate. Iniţial, am selectat un total de 65 de articole, din care, în urma aplicării criteriilor de excludere, am rămas cu un număr de 10 articole.
Rezultate: S-a observat că hidroterapia sau exerciţiile efectuate în apă au multiple efecte benefice asupra organismului uman, în special la persoanele care suferă de diverse afecţiuni ale coloanei lombare.
Concluzii: Hidroterapia este o metodă de tratament benefică în reabilitarea diferitelor afecţiuni ale coloanei vertebrale, atât folosită independent, cât şi în asociere cu alte metode de tratament accesibile.

Cuvinte cheie*: hidroterapie, coloanala vertebrală, deficiente, exerciţii în apă*

[1] Assistant Professor, PhD student, West University of Timişoara, Physical Education and Sports Faculty, Romania, *e-mail: dan.pirjol@e-uvt.ro*
[2] Associate Professor, PhD, Babeş-Boyai University of Cluj-Napoca, Faculty of Physical Education and Sports, Romania,
[3] Professor PhD, West University of Timişoara, Faculty of Physical Education and Sports, Romania
[4] Research Assistant, West University of Timişoara, Faculty of Physical Education and Sports, Romania

Introduction

Hydrotherapy is a common comfort measure, a treatment and care intervention and it is a therapy prescribed in several clinical specialties for soothing and health-promoting qualities. A warm bath at the end of a stressful day can be a relaxing activity in everyday life, and immersion hydrotherapy is a prescribed therapy in many clinical specialties for its soothing and health-promoting qualities (Trinidad, 2021).

Aquatic exercise in warm water has been commonly known as hydrotherapy (HT) or aquatic therapy (AT) or aquatic physiotherapy (AP) and is a popular treatment for many patients with painful musculoskeletal conditions. The pain-relieving effects have been attributed to a wide variety of mechanisms. The warmth and buoyancy of water can block nociception by acting on thermal and mechanoreceptors, thereby influencing segmental mechanisms of the spine. In addition, heat can increase blood flow, which is thought to help dissipate algogenic chemicals and facilitate muscle relaxation (Shaw-Battista 2017).

The hydrostatic effect may also relieve pain by reducing peripheral edema and by dampening sympathetic nervous system activity. Some reports have demonstrated the effectiveness of water exercise, and comprehensive health education, including lifestyle education for middle-aged and elderly people (Derikvandi and Goudarzi, 2017).

Aim

Through this study, we aimed to analyze as many articles as possible on the topic of hydrotherapy as a spine ailments recovery method. We also tracked what kind of recovery programs or exercises were performed with the patients in the water and which ones gave the best results.

Materials and methods

We searched and analyzed articles published in the 2011-2022 period, using the Google Scholar search engine and databases such as Science Direct, PubMed and Research Gate), and were selected according to the following criteria: to be written in English to trace the connection between postural deficiencies and hydrotherapy treatment, and hydrotherapy to be used in spinal disorders. We excluded from our study the articles that did not discuss the use of hydrotherapy in spinal disorders, the articles published before 2010, and articles to which we did not have access in the extenso version. Initially, we selected a total of 65 articles, from which, following

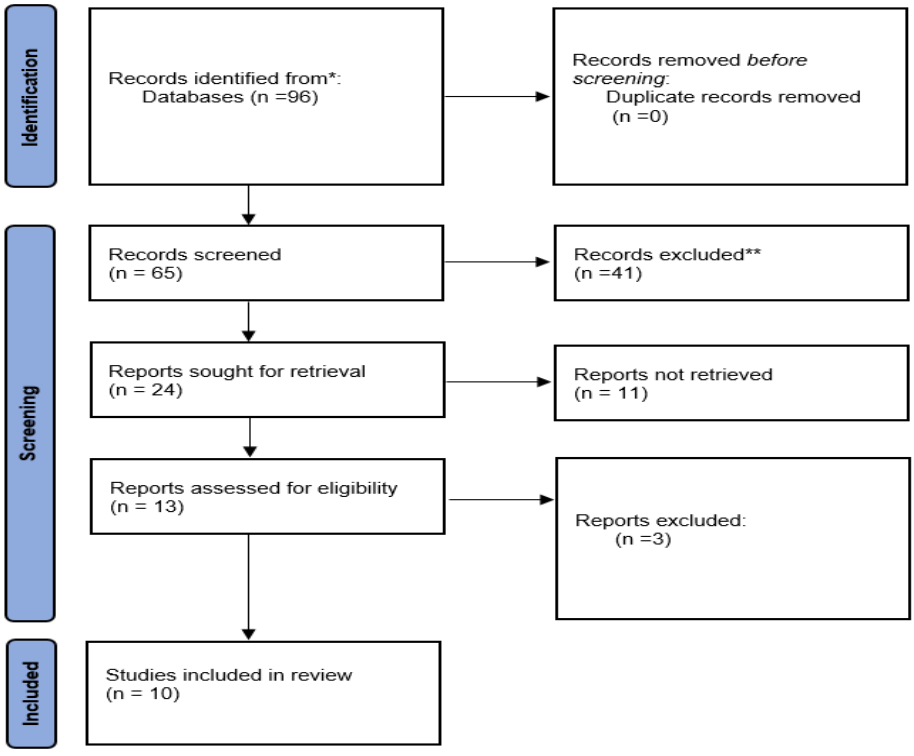


Fig 1. PRISMA flow chart demonstrating identification, screening and selection of included studies (Page et al., 2021)

the use of exclusion criteria, we were left with a number of 10 articles (Fig1).

Results

From 10 articles studied, 5 studies focused on the effect of hydrotherapy in the recovery of low back pain. These studies have shown that exercises performed in water can reduce pain in the lumbar spine, and two of them showed that there are statistically significant differences between exercises performed in water and land-based exercises (Fig.2). On the other hand, other studies have shown that the combination of this two treatment options, hydrotherapy and classical physiotherapy, brings the best results. More than that, one article stated that the Back Schools exercises should be encouraged for their simplicity and the low number of resources required (Costantino and Romiti 2014).

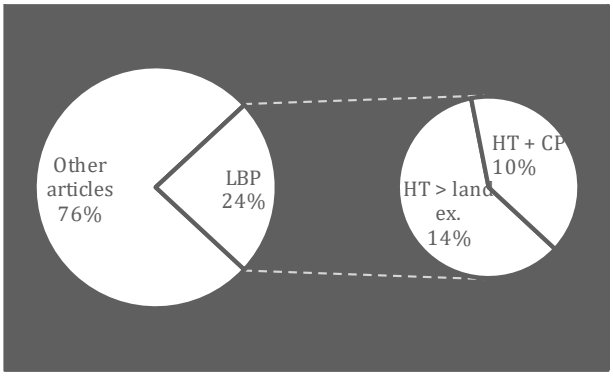


Fig. 2 – Hydrotherapy in low back pain.
Legend: LBP-low back pain; HT– Hydrotherapy; CP-classical physiotherapy

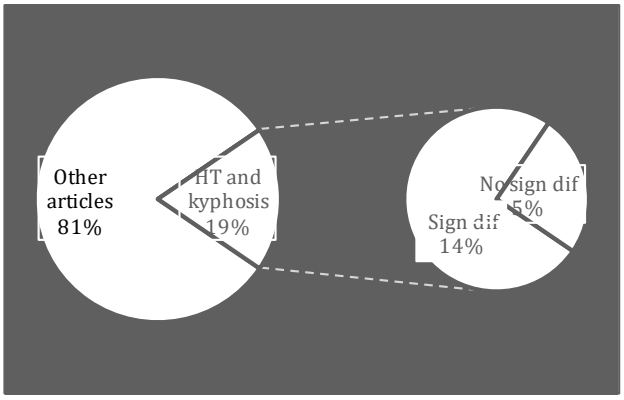


Fig. 3 – Hydrotherapy in the recovery of kyphosis

We also analyzed studies that investigated the effects of hydrotherapy in subjects with postural deficiencies such as kyphosis and scoliosis. These have been shown to be effective both in correcting and preventing this disorders. From these articles, only one concluded that there were no statistically significant differences between hydrotherapy and land-based exercise (Sawant and Shinde, 2019). (Fig 3).

For patients with lumbar spinal stenosis, aquatic therapy may provide greater short-term improvement in pain and function than conventional physical therapy, particularly in those with limited land-based exercise capacity (Gaber, 2014).

When comparing hydrotherapy with home exercises in patients with ankylosing spondylitis, it was concluded that pain level and quality of life were improved in subjects who performed the exercises in water (Dundar et al. 2014).

One study focused on the effect of hydrotherapy on performance cyclists and concluded that, although the performance results were modest, a positive effect was observed on the recovery of the athletes (Stanley, 2012).

Discussion

Hydrotherapy was chosen as a rehabilitation method because it facilitates the application of established therapeutic intervention, including stretching, strengthening, joint mobilization, balance, gait re-education and resistance training that help reduce back pain due to its unique physical characteristics and reduced risks. However, many articles claim that the best results in treating back pain are obtained if hydrotherapy is associated with another therapeutic method. Thus, a significant improvement has been observed in treating low back pain, by using land-based exercise and water-based exercise in thermal mineral water. However, there were no significantly different results between the two methods (Nemčić et al. 2013).

Sawant aimed to compare the effect of hydrotherapy exercises and conventional physiotherapy in non-specific chronic low back pain and concluded.

Table I. Main characteristics of the included studies

Author	Participants	Intervention	Results
Azizi, 2011	10 girls with postural kyphosis (age:19-23)	6 weeks, 3x1h/week of hydrotherapy.	There was a significant difference between the post-test compared to the pre-test for the back muscle strength (p≤0.05), shoulder abduction (p≤0.05) spinal flexibility and chest expansion (p≤0.05).
Castro-Sánchez et al. 2012	73 multiple sclerosis patients.	Experimental group performed 40 sessions of Ai-Chi exercises in the pool and the control group 40 sessions of abdominal breathing and contraction-relaxation exercises in the therapy room.	The experimental group showed a significant (P < 0.028) and clinically relevant decrease in pain intensity from the initial value, with an immediate post-treatment reduction in median visual analog scale scores of 50% maintained up to 10 weeks.
Costantino and Romiti, 2014	56 elderly people affected by non-specific CLBP	3 months, 1h/week. Back Schools (group A), hydrotherapy program (group B)	No statistically significant differences between effectiveness of the two groups
Dundar et al. 2014	69 AS patients, control group- home exercises and intervention group water exercises	20 sessions, 5 times a week for 4 weeks, 1h/session	Showed that the improvement in VAS (p<0.001) and body pain (p<0.001), general health (p<0.001)
Gaber, 2014	30 patients, (2 groups of 15), age: 13-17	6 weeks,3x30min/week. Group A- corrective exercise in water and group B corrective exercise in land.	In land group and in water group the degree of kyphosis, improved significantly (p≤0.05). Finally, between two groups were not observed any significant difference in degree of kyphosis.
Yalfani et al. 2017	24 patients, (2 groups of 12), age: 20-40	6 weeks, 2x1h/week of Aquatic therapy.	The results of t-test showed that the experimental group had significantly improved dependent variables: pain, disability, static balance and trunk and pelvic girdle function (p <0/05).
Prabhu and Dadmi, 2019	20 patients, (2 groups of 10), age: 20-50	2 weeks, 4x1h/week Group A: Aquatic therapy, Group B: Relaxation therapy.	Aquatic therapy and relaxation therapy both effective for chronic low back pain(p≤0.05). It is proved that aquatic therapy is more effective

			compared to relaxation therapy on chronic low back pain
Sawant and Shinde, 2019	30 patients, (2 groups of 15), age: 20-40	12 weeks, 3x1h/week, group A-conventional physiotherapy, group B-Hydrotherapy	There was no statistically significant difference in intergroup comparison (between group), but there was significant improvement in subjects who underwent conventional therapy and hydrotherapy
Slodownik er al. 2020	23 patients, (2 groups of 10 and 13), age: 14-16	4 weeks, 3x1h/week of Aquatic breathing therapy, correctiv swimming	Experimental group demonstrated a greater increase (p = .05) in the predicted percentage values of forced expiratory volume in 1 s (FEV1) and maximal expiratory flow at 25% of forced vital capacity (MEF25), both in absolute terms and in percentage values (MEF25%pred) compared to the CS group.
Khanjari and Kalkhoran, 2020	20 patients, (2 groups of 10), age: 50-55	8 weeks, 3x 50 to 80 min/ week, progressively and increasingly with 40 to 60% of the maximum heart rate reserve	The results showed that aquatic exercise program can be considered as an effective and reliable method to decrease chronic low back pain related herniated disc (P= 0.010).

that there was a significant improvement in subjects who underwent both conventional therapy and hydrotherapy (Sawant and Shinde, 2019).

Murta 2013, in his article, states that chronic pain is the leading cause of disability. Hydrotherapy and physical exercise effectively reduce chronic pain; however, we continue to see few people adhering to this type of treatment. Aquatic therapy may provide greater short-term improvement in pain and function than conventional physical therapy, particularly for those with limited land-based exercise capacity (Homayouni et al. 2015). Also, Costantino and Romiti 2014, recommends Back schools recovery program and Hydrotherapy for the rehabilitation of non-specific cronic low back pain (CLBP) in elderly people. Both therapies have been shown to be effective and can be used in conjunction with other rehabilitation programs (Costantino and Romiti 2014, Khanjari and Kalkhoran 2020).

Nevertheless, Yalfani (2018) observed that aquatic therapy can be an effective therapeutic method to improve the physical condition, health, pain, disability and balance of patients (Yalfani et al. 2018).

In the reviews conducted by Mooventhan and Nivethitha in 2014, they stated that hydrotherapy is one of the basic methods of treatment widely used in the system of natural medicine, which is also referred to as water therapy, aquatic therapy, pool therapy, and balneotherapy. Use of water in various forms and in various temperatures can produce different effects on different body systems. Many studies or reviews reported the effects of hydrotherapy only on very few systems, and there is

a lack of studies or reviews reporting the evidence-based results of hydrotherapy on various systems (Mooventhan and Nivethitha 2014).

Dundar (2014) states in his work that aquatic (water-based) exercises can have a beneficial effect in various musculoskeletal conditions. Also, the author concluded that water-based exercise produced better improvement in ankylosing spondylitis(AS) patients' pain score and quality of life compared to home exercise. Several studies have reported that complementary and alternative therapies can have positive effects against pain in these patients. In the "Hydrotherapy for the treatment of pain in people with multiple sclerosis: a randomized controlled trial" article, Castro-Sánchez investigated the effectiveness of an Ai-Chi water exercise program against pain and other symptoms in MS patients. The research results showed that an aquatic Ai-Chi exercise program improves pain, spasms, disability, fatigue, depression, and autonomy in MS patients (Castro-Sánchez et al. 2012).

Many patients with spinal cord injury (PWSCI) lead a sedentary lifestyle with poor quality of life and medical challenges. PWSCI do not like to participate in land-based exercises because it is tiring to perform the same exercises, which reduces their motivation to rehabilitate and has a negative impact on their well-being. An alternative exercise environment is hydrotherapy. The aquatic environment can alleviate boredom, increasing patient interest. Ellapen et al. (2018) in their review, analyzed 15 articles and concluded that Hydrotherapy helps reduce PWSCI muscle spasticity and cardiometabolic risk profiles while improving underwater walking and cardiorespiratory fitness.

As the trend is now increasing towards the use of sports exercises and physiotherapy instead of medical and surgical intervention, Gaber Mohamed in his study, states that the use of water and land exercises for correcting the curvature angle of kyphosis in young female gymnasts and applying further studies on different samples and using different types of exercise protocols to avoid surgical interference and increase self-esteem for those young members of society, can be suggested (Gaber 2014). In the article "The Effect of an Adapted Swimming Program on the Performance of an Individual with Kyphosis-Scoliosis", Dimitrios proposes to examine the effect of an adapted swimming program in terms of improving the performance and behavior of an individual with kyphosis-scoliosis, using an education individualized approach. The results of the study revealed the beneficial effect of swimming lessons in terms of improving an individual's swimming skills and behavior. Considering the findings, useful conclusions were drawn regarding the swimming program structure (Dimitrios and Dimitrios 2004). The aquatic rehabilitation program carried out by Hasaneen, had positive effects on students with kyphosis, thus the exercises performed in the aquatic environment positively influenced spinal mobility, lung capacity and general physical condition of the students (Hasaneen , 2017).

Conclusions

Following the analyzed studies, it was observed that hydrotherapy or exercises performed in water have multiple beneficial effects on the human body, especially in people suffering from various ailments at the level of the lumbar spine. Furthermore, we can say that most of them have demonstrated that hydrotherapy can be a solid option that should be added to the treatment program in addition to the other classical or conventional methods.

We can conclude that hydrotherapy is a beneficial treatment method in the recovery of spinal disorders, both alone and in parallel with other treatment methods that still exist on the market.

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