Reabilitacijos mokslai: slauga, kineziterapija, ergoterapija, 2 (27) 2022, 51–67
ISSN 2029-3194 / eISSN 2538-8673;DOI: https://doi.org/10.33607/rmske.v2i27.1262

A Systematic Review of the Effects of Aquatic Therapy on Motor Functions in Children with Cerebral Palsy

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ABSTRACT

Background. Cerebral palsy (CP) is one of the most common childhood disorders. Different treatment strategies are used to improve quality of life.

*Aim***.** To systematically review the recent articles and investigate the effects of aquatic therapy on motor functions in children with cerebral palsy.

*Methods***.** Studies between 2012–2022 were selected investigating the effects of aquatic therapy on motor functions in CP children. The databases Google Scholar, PubMed and PEDRO were used. Selection criteria included diagnosis as CP, use of aquatic intervention, participants aged until 18 years, use of validated outcome measure, published in English, and study design as a randomized control trial/pilot study/case study.

Results. Out of 11 studies selected for this review, 6 of them were randomized control trials, 2 were quasi experimental studies, 2 were comparative studies and one was case series. Aquatic exercises, Halliwick concept, Watsu and water immersion therapy, swimming exercises were used as aquatic interventions in the studies. Gross Motor Function Measure (GMFM) was the most commonly used tool for recording motor functions. About 64% of studies showed that aquatic interventions can provide significantly beneficial effects on motor functions of children with CP when compared to conventional therapy or no intervention.

Conclusions. Aquatic therapy provides beneficial effects on motor functions in children with cerebral palsy.

Keywords: cerebral palsy, aquatic therapy, aquatic exercises, swimming program, motor functions.

INTRODUCTION

Cerebral palsy (CP) is an umbrella term referring to disorders related to movement, posture and balance (Blair, Cans, & Sellier, 2018; Vitrikas, Dalton, & Breish, 2020). The disorders are the result of damage to the central nervous system while it is still developing. According to the data and statistics given by CDC, cerebral palsy is the most common motor disability in childhood prevailing in among 1 to almost 4 out of 1000 children (Centers for Disease Control and Prevention, 2020). Although cerebral palsy is a non-progressive disorder, it leads to permanent disability or disabilities, but the clinical expression changes as the brain matures overtime (Michael-Asalu, Taylor, Campbell, Lelea, & Kirby, 2019).

Cerebral palsy has many multiple aetiologies leading to different levels of severity (MacLennan, Thompson, & Gecz, 2015). Also, there are multiple risk factors associated with the prevalence of CP. These risk factors range from a timeline of prenatal period through the perinatal until the postnatal period. Some of the major risk factors include, low birth weight, asphyxia, multiparity, infections of the mother during pregnancy and consanguinity, that is the genetic relatedness of the parents (Ghazal, Ahmad, & Rahat, 2019). The diagnosis of CP involves a thorough medical history of the patient, neuroimaging and the neuromotor assessment tools (Spittle, Morgan, Olsen, Novak, & Cheong, 2018). The patients with CP may also present with other deficits in sensory, intellectual and cognitive functions (Bax et al., 2005).

Multidisciplinary rehabilitation plays a crucial role which aims at providing the best quality of life for the patient and the family (Trabacca, Vespino, Di Litto, & Russo, 2016). There are different treatment strategies when it comes to the treatment and rehabilitation of a CP patient which will be discussed in depth in the later section of this article. Out of many other rehabilitation approaches, aquatic therapy is seen to provide a different treatment environment for the patient. The properties of water provide CP patients with an opportunity to perform movements and exercises that are difficult on land (Kelly & Darah, 2005). Many previous articles have studied the effects of aquatic therapy in CP patients. New studies have been published since then, directing towards a need to systematically review and update information regarding this topic in the research.

The aim of this study was to systematically review recent articles and investigate the effects of aquatic therapy on motor functions in children with cerebral palsy.

METHODS

Search of articles and their selection criteria

The databases Google Scholar, PubMed and PEDRO were used to search for articles. The search was limited to the last 10 years, that is from 2012 to 2022. Key terms used in the search of the articles included aquatic therapy, aquatic exercise, hydrotherapy, swimming, motor functions which were then used in combination with cerebral palsy.

The selection criteria of the studies used in this review are as follows:

1. Study participants diagnosed with CP (no limitations on types of CP or GMFCS)
2. Participants of the study between the age from birth to 18 years of age

3. Application of any type of aquatic intervention
4. Use of validated outcome measures for motor functions
5. RCTs (primary preference), pilot studies, or case studies
6. English as the language of literature

Level of Evidence

All the studies were searched through the scientific databases mentioned earlier. The studies were screened for their level of evidence by using the grading system provided by the National Health and Medical Research Council (NHMRC) of the Australian Government. The levels of evidence and their grading are presented in Table 1.

Table 1. **Levels of evidence by National Health and Medical Research Council**

Levels	Type of study
I	A systematic review of level II studies
II	A randomized control trial (RCT)
III-1	A pseudorandomized control trial (i.e. alternate allocation or some other method)
III-2	A comparative study with concurrent controls: • Non-randomized experimental trial • Cohort study • Case-control study • Interrupted time series with control group
III-3	A comparative study without concurrent controls: • Historical control study • Two or more single arm studies • Interrupted time series without a parallel control group
IV	Case series with ether post-test or pre-test/post-test outcomes

Note: National Health and Medical Research Council levels of evidence and grades for recommendation, 2009.

Selection of studies

The initial search of databases led to 99 articles, but after removing the duplicates, screening through the title and abstract, and applying the inclusion and exclusion criteria, 11 articles were then selected for this review. A detailed procedure of selection of studies using PRISMA flowchart is provided in Figure 1.

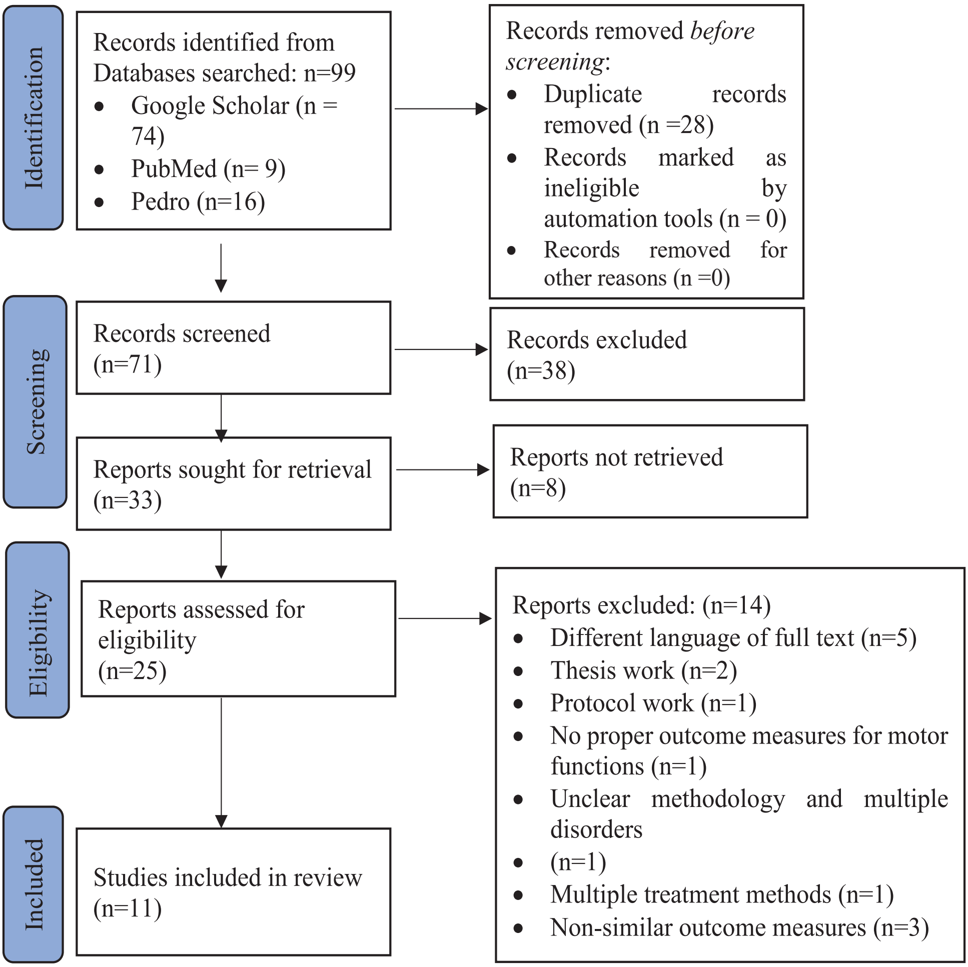

Figure 1. **Procedure for selection of articles with PRISMA flow chart**

Data collection

The data from each study was collected and organized in a table format and pie diagrams. Information about the type of study, patient characteristics (age, gender, type of CP, GMFCS scale of the patients), sample size, aim of the study, the type of aquatic intervention used, control group intervention (if present), the temperature of the water, the duration and frequency, assessment time periods, primary outcome measures used in the study, changes in the value of outcome measures post intervention and in follow-up if present, along with their significance value and conclusion was collected.

Statistical methods

To summarize the information collected from each study the data were put into tables. We counted total number (n) of participants in both Experimental group (EG) and Control group (CG). Statistical methods using SPSS and Excel programs were used. For each feature, the minimum (min), maximum (max) and average were calculated.

RESULTS

Characteristics of the studies

About 55% of the studies included in this review were RCTs with grade II for their level of evidence whereas the quasi-experimental studies with III-2 level of evidence contributed 18%, as did the comparative studies having the III-3 level of evidence. The contribution of case study, level of evidence IV, was 9%.

Characteristics of the participants

The age of the participants in the studies ranged from 2 years to 18 years. The studies included participants with different GMFCS levels, ranging from level I to level V. The participants in the studies were diagnosed with different types of CP including spastic, dyskinetic and ataxic CP (Table 2).

Table 2. **Characteristics of the participants**

Author	Sample size	Mean age (years)	Gender	GMFCS level	CP type
Jorgic et al., 2012	n=7	9.5±1.3	4 M, 3 F	I, II, III	Spastic CP
Fragala-Pinkham et al., 2014	n=8	10.6±3.5	4 M, 4 F	I and III	Spastic diplegic CP and hemiplegia.
Lai et al., 2015	n=11 in EG; n=13 in CG	7.2	4M, 7F in EG; 9M, 4F in CG	I–IV	Spastic CP
Dimitrijević et al., 2012	n=14 in EG; n=13 in CG	9.6±2.4	10M, 4F in EG; 7M, 6F in CG	I–V	Spastic CP
Shelef, 2016	n=5	11.7±2.1	4M, 1F	IV	Spastic CP
Adar et al., 2017	n=17 in EG; n=15 in CG	9.7±2.7	17M, 15F	I–IV	Spastic CP
Naidoo & Ballington, 2018	n=5 in EG; n=5 in CG	11±0.1	2M, 8F	I–III	Not mentioned.

Author	Sample size	Mean age (years)	Gender	GMFCS level	CP type
Akinola et al., 2019	n= 15 in EG; n=15 in CG	5.2±2.4	Not mentioned	II–V	Spastic CP
Amini et al., 2020	n=6 in EG; n=6 in CG	15.3±0.1	12M	I–III (assumption)	Spastic CP
Mostafa et al., 2021	n= 11 in EG; n= 13 in CG	3.1±0.3	5M, 6F in EG; 8M, 5F in CG	V (assumption)	3 ataxic, 3 dyskinetic, 5 spastic CP in study group; 3 ataxic, 3 dyskinetic, 7 spastic CP in control group.
Tufekcioglu et al., 2021	n= 12 in 1st group; n=11 in 2nd group.	7.5±2.8	5M, 7F in 1st group; 7M, 4F in 2nd group	I–II	2 spastic diplegic and 21 spastic hemiplegic.

Note: n – number of participants, CP – Cerebral palsy, GMFCS – Gross Motor Function Classification System, F – Female, M – Male,

A total of 202 participants were included in the studies, of which 122 participants belonged to the experimental group, whereas the control group consisted of 80 participants. There was a minimum of 5 participants and a maximum of 23 participants in the experimental group. The control group ranged between 0 to 15 participants. Mean number of male participants was found to be 9.8 ranging from 2 to 17 and for female participants it was 7.4 with minimum of 0 and maximum of 15 participants. The average age of the participants in the included studies was found to be 9.1±1.3 years.

A majority of 68% of participants in the studies were classified with GMFCS levels between I –III. The remaining 32% were divided by GMFCS levels IV and V, by 17 % and 15% respectively.

Considering the type of CP that patients were classified with, spastic CP contributed for 94% of the patients with 180 number of patients, followed by dyskinetic CP and ataxic CP sharing the remaining 6% of the patients equally, with an equal number of 6 patients in each type.

Description of interventions

Various aquatic approaches were used in the studies with a variety in their duration and frequency. An average time of 55.6±19.6 minutes/ session was calculated from the included study whereas the mean duration of the entire aquatic intervention was 8.7±3.1 weeks. The mean frequency of the sessions was 2.5±1.1 times/week. The mean total sessions of aquatic interventions were calculated as 19.7±6.1. A detailed information about the duration of the session and intervention, frequency and total number of sessions in each study is provided in Table 3.

Table 3. **Duration, frequency, and total number of sessions in each study**

Author	Duration of the intervention (mins/ session)	Frequency of the session (time/week)	Duration of intervention (weeks)	Total number of sessions
Jorgic et al., 2012	45	2	6	12
Fragala-Pinkham et al., 2014	60	2	14	28
Lai et al., 2015	60	2	12	24
Dimitrijević et al., 2016	55	2	6	12
Shelef, 2016	56	4	4.5	19
Adar et al., 2017	60	5	6	30
Naidoo & Ballington, 2018	30	2	8	16
Akinola et al., 2019	100	2	10	20
Amini et al., 2020	60	2	8	16
Mostafa et al., 2021	Not mentioned	Not mentioned	12	Not mentioned
Tufekcioglu et al., 2021	30	2	10	20

The aquatic approaches used in the studies were aquatic exercises, the Halliwick concept, swimming program and water immersion therapy. Majority of aquatic programs included a basic form of warm-up, main program and lastly a cool down. The studies also applied aquatic therapy with variable temperature of water environment. Description of the aquatic programs used in the studies and the water temperature in each study is provided in Table 4.

Table 4. **Description of the aquatic program**

Author	Type of aquatic intervention	Aquatic program	Water temperature
Jorgic et al., 2012	Halliwick	Ten-point program of the Halliwick concept, swimming exercises + games	Not mentioned
Fragala-Pinkham et al., 2014	Aqua exercise	Warm up: 2–5 mins Aerobic exercises: 40–45 mins, deep water walking, pool treadmill walking, step climbing, running, jumping climbing, swimming, prone kicking, etc. Strength training: 5–10 mins, trunk and extremities movement with aquatic noodles, fins, leg weights and water resistance for 2–3 sets of 10 reps. Cool down: 5–10 mins	32°C
Lai et al., 2015	Halliwick	Warm up and stretching: 5–10 mins. Main pool exercises: 40 mins. Cool down: 5–10 mins.	34.5°C
Dimitrijević et al., 2016	Swimming program	Warm up: 10 mins Main program: 40 mins, gliding, floating, blowing bubbles, diving to the floor of the pool, swimming techniques. Play: 5 mins	27.7°C
Shelef, 2016	Mixed method design, PIA	PIA + land Land only intervention Water only intervention	33.6°C
Adar et al., 2017	Aquatic exercises	Poolside warm-up: 10 mins Main pool session, 25 mins aerobic exercise (walking in different direction and swimming) followed by 20 mins of strengthening exercises, active ROM exercises, stretching exercises. Cool down: 5 mins	33°C
Naidoo & Ballington, 2018	Halliwick concept	Warm up: 5 mins Main program: 20 mins, based on Halliwick concept. Cool down: 5 mins	Not mentioned

Author	Type of aquatic intervention	Aquatic program	Water temperature
Akinola et al., 2019	Aquatic exercises	2 categories of exercise: Manual passive stretching of spastic muscle group2, hold for 60 secs, 5 reps. Functional training in 4 levels namely, 2-point kneeling exercises training, sitting training, standing training, walking training. Training of each level for 15 mins.	30°C
Amini et al., 2020	Aquatic exercises	Warmup – 10 mins Main program – 35 to 40 mins, stretching, walking in different directions, isolated movements of upper limbs and for lower limbs. Cool down – 5 to 10 mins	29°C
Mostafa et al., 2021	Aquatic exercises	Prone position: lifting of head (extend) and elevating the arms to reach the toys and movement of the patient in prone position horizontally forward, backward and sideways for exercising righting reactions. Supine position: lifting the head (flexing) and the arms to reach for toys and similar movements of the body by the therapist for exercising righting reactions.	Not mentioned
Tufekcioglu et al., 2021	Watsu and immersion therapy	Watsu therapy consisted of spine rotating techniques such as slow offering, leg offerings, free spine, spiral offerings, accordion, rotating accordion, twist over, corner spread, chest opening, seaweed. Immersion therapy consisted of supporting the back of the patient's head and neck with specific floating tool and allowing the rest of the body to remain in the water.	33°C

Note: PIA – Partial Immersion Approach, CG – control group, min – minutes, reps – repetitions, OT – Occupational Therapy

A total of 46% of the studies included in this review used aquatic exercises as Aquatic PT intervention. Halliwick concept covered the second highest majority of 27% of the intervention used in the studies, whereas Watsu and immersion therapy contributed a total of 18% and swimming program contributed 9% of the aquatic interventions applied. A total of 8 studies mentioned the water temperature: the minimum water temperature mentioned was 27.7°c, whereas the maximum water temperature was provided by Lai et al., (2015) of 34.5°c.

Outcome measures

A total of 27 different outcome measures were used in the studies included in this review to measure different aspects of the patient such as motor functions, quality of life, fatigue, spasticity, exercise load, balance, enjoyment, behaviour, functional independence, activities of daily living, sitting evaluation, strength, endurance and aerobic capacity. Out of all these outcome measures, GMFM (66 & 88) was the outcome most commonly used for measuring motor functions. Hence, for this review, GMFM is considered as the main outcome measure.

Effect of aquatic interventions on motor functions

Effect of aquatic intervention with the outcome measures used and the duration of their measurement in each study is given in detail in Table 5. For studies with a control group, between group measurement values are mentioned, whereas for studies without a control group pre-test and post-test measurement values are mentioned, along with the level of significance (p value). Follow-up scores were compared with baseline scores.

Table 5. **Effects of aquatic intervention on motor functions**

Author	Effects	Duration	p value
Jorgic et al., 2012	GMFM-88: ↑1.64%	6 weeks	p = 0.03
Fragala-pinkham et al., 2014	GMFM dimensions D & E: ↑7.3% Follow up score: ↑7.4% compared with baseline	14th week, 1 month post treatment	p = 0.004 p = 0.003
Lai et al., 2015	GMFM-66: ↑5%	12th week	p = 0.007
Dimitrijević et al., 2012	GMFM-88: At post-test – ↑4.39% At 9th week – ↓0.5%	6th week, 9th week (follow up)	Comparing experimental and control group p = <0.05 at post-test
Shelef, 2016	GMFM: ↑ 2.07% for all cases.	Post treatment	p = not mentioned
Adar et al., 2017	GMFM: change of score 0.05±0.05	6th week	p = 0.451.

Author	Effects	Duration	p value
Naidoo & Ballington, 2018	GMFM-66: ↑4.25 points No carry over effects post 1 month of washout period.	8th week	p = 0.005
Akinola et al., 2019	GMFM-88: ↑1.4 points	4th week, 8th week, 10th week	p<0.05
Amini et al., 2020	GMFM-66 walking position: ↑6% At follow-up: ↑7.8% GMFM-66 standing position: ↑3.8% At follow-up: ↑5.4%	8th week, 2 months post treatment.	p = 0.11 p = 0.44
Mostafa et al., 2021	GMFM-88 dimension A: ↑25.5% GMFM-88 dimension B:↑8.1%	3 months	p = 0.17 p = 0.25
Tufekcioglu et al., 2021	GMFM-88 (mean) for W-I group: ↑ 0.002 in period 1 and ↑0.001 in period 2. GMFM-88 (mean) for I-W group: ↑0.001 in period 1 and ↑0.002 in period 2. No carry-over effect seen in a 6-week washout period.	10th week, 26th week.	p = 0.000

Note: GMFM – Gross Motor Function Measure, ↑ – increase, ↓ – decrease

To summarize table 5, about 64% of the studies included in this study showed significant differences in the results ($p<0.05$), proving that aquatic therapy is effective, whereas 27% of them showed similar effects ($p \geq 0.05$) of aquatic therapy when compared to post-intervention or to conventional physiotherapy. About 9% of the studies demonstrated an absence of p-value.

DISCUSSION

The purpose of this systematic review was to analyse the evidence present for effect of aquatic therapy on motor functions in children with CP. According to the results obtained from this review, 7 out of 11 studies showed that motor function outcome measures improved after the treatment (in the studies who did not have a control group) or when compared with the control group (in the studies who had a control group) with an eligible significance level.

One of the studies, by Shelef (2016) did not mention the level of significance for the results, it was a case series. It did mention that GMFM improved at the end of the treatment. The remaining three studies (Adar et al., 2017; Amini et al., 2020; Mostafa et al., 2021), with no significant change in their motor outcomes were compared with their control groups, two of which practiced land-based exercises whereas one received OT, although not during the intervention period. The reason might be due to the older age of the participants in two of the studies, namely, Amini et al. (2020) and Adar et al. (2017). Decrease in the rate of brain maturation and metabolism may have played its role here, as the older the children are, the slower is their rate of brain maturation when compared with younger children (Tau & Peterson, 2010; Gilmore, Knickmeyer, & Gao, 2018). But for the third study by Mostafa et al. (2021), the participants were younger when compared, and the intervention lasted longer. When considering the frequency and time/session of the intervention during the three months of intervention, there was a lack of information. One of the possible reasons could be that, unlike other studies, this study included patients with different types of CP such as ataxic, dyskinetic and spastic CP. This may have contributed to its results, as aquatic therapy is well researched for the spastic type of CP, being the most common form of CP (Tecklin, 2008). But more research is to be done for ataxic and dyskinetic types of CP.

More than half of the participants in the studies were with GMFCS level between I–III, while the remaining participants received the application of aquatic therapy in patients with GMFCS IV and V. The results achieved through this review were variable for different GMFCS levels. In general, patients with levels I–III, were seen to be benefitted with the intervention except for two studies, Adar et al. (2017) and Amini et al. (2020).

Out of the all the 6 studies that included patients with GMFCS levels IV/V, 3 of them showed significant improvement, whereas one study by Shelef (2016) did not mention the significance value. Mostafa et al., studied the children with CP of GMFCS level V only, and no significant difference was found here. The study by Adar et al. (2017) did not show any between groups significance, where the reason might be, it included patients with GMFCS levels I–IV. Children with GMFCS level IV are more dependent on the caregivers due to their limitations and this might have affected the results, as there could be a possibility for the subjects to show better improvement with longer duration of intervention when compared with children of GMFCS level I–III. Also, the patients in this study were older than those of the 2 studies with significant results between groups.

The results of this review suggest that aquatic therapy has the potential to achieve better motor functions in CP patient with GMFCS levels between I–III when compared with conventional land-based therapy or to no intervention. Although many factors may affect this statement such as the smaller sample size of the studies, level of cognition of the subjects, participation and activity level, previous acquaintance with the water environment, other disabilities such as hearing or vision impairments, etc. which were not clearly specified in the studies. Further research providing information about the mentioned features may be helpful in determining distinct conclusions in future.

For the CP patients with GMFCS levels IV–V, the results suggest that there is probably a need for trials to include longer intervention to achieve significant results. The age factor has also shed light on the importance of early intervention in both patients with GMFCS IV–V and patients with GMFCS level I–III (Novak et al., 2020).

The information obtained from the results of duration and frequency of water interventions suggested that an aquatic program of an optimal duration of two months, provided for approximately an hour/session with a frequency of more than twice a week has the capability to provide CP children with improvements in motor functions.

When considering the long-lasting effects of aquatic intervention, the results are quite variable. There are only a few studies including follow-up measures. Although information about the procedures done post-treatment (if any) or if they were not applied, is not mentioned, the follow-up outcome measures in the studies included in this review showed that the results were maintained until one to months after the completion of treatment in 2 studies whereas, one study showed the return of motor functions back to baseline in less than a month follow-up. The reason could be shorter duration of intervention in this study when compared with studies with maintained effects of intervention at follow-up.

On the other hand, the studies investigating carry-over effects of aquatic therapy showed that a washout period of a month or one and half month is enough for the effects of aquatic intervention to wash off. More trials should investigate the follow-up outcome measures and the carry-over effects, as this can provide clinicians with an estimate about how frequently in a certain period of year do we need to apply aquatic therapy for CP patients in order to prevent the loss of effects gained due to aquatic interventions.

The average water temperature found through this review was 31.6 ±2.4°c. However, different types of aquatic interventions were used in this review, and different water temperatures are recommended depending on the type of pool activities. For a therapeutic pool activity, a higher temperature of 33–35.5°c is recommended, whereas for a recreational pool activity, a lower temperature of 30–31°c is indicated (Hanlon & Hines, 2007).

In future research, studies can shift their focus from the effects of aquatic therapy on spastic CP patients to other types of CP also, such as ataxic, dyskinetic or hypotonic, as the research is lacking in this regard. For higher levels of CP patients, GMFCS IV–V, and those who are highly dependent on the care giver as in need of longer and more comprehensive rehabilitation, there is lack of competent evidence, which should be also taken in consideration in future research. When it comes to whether aquatic therapy should be included in the PT program of a CP patient, although it is still variable, the studies report no harm or drawbacks to patients. Such therapy does manifest abundant potential for the improvement of motor functions in CP patients and hence, should be implemented as a concomitant therapy with other conventional goal-directed and functional treatment approaches.

This review showed that aquatic therapy holds benefits for children with CP either higher than or similar to land-based therapy. It is a good change of environment for the patients, as were it not for rehabilitation services CP patients may spend the majority of their time at home due to their limitations. This change in environment has the potential to provide them with better psycho-social outcomes (Thorpe & Paul, 2020; Blanco et al., 2020) and not only motor outcomes, which has been the main focus of the ICF-CY (World Health Organization, 2007). However, while it remains a possibility to be implemented in every rehabilitation facility, it requires a great deal of funds and maintenance, and this may not be possible in some underdeveloped or developing countries or facilities. Therefore, the responsible healthcare system in different countries should take into consideration the investment for provision of aquatic interventions in the rehabilitation of CP patients. Studies explaining the statistics of healthcare systems and management of funds may help the governments to find solutions. Further studies are suggested to conduct bigger trials with the points discussed before in order to provide higher evidence, continuing to prove the worth and need of aquatic therapy in the rehabilitation of children with CP, helping systematic reviews in future to provide conclusions with only the highest levels of experimental trials.

This study did have limitations as the studies that included other disabilities along with CP were not included in this study in order to focus mainly of cerebral palsy. This might have affected the results of this study.

CONCLUSIONS

Aquatic exercises, the Halliwick concept, Watsu therapy, water immersion therapy and swimming program were the aquatic interventions used to treat children with cerebral palsy. The mean duration of aquatic intervention found was approximately two months. The mean frequency was greater than twice a week with a duration for each session of about one hour. The motor functions in cerebral palsy patients when provided with aquatic therapy were significantly improved in more than half of the studies included in this review, concluding that aquatic interventions provide beneficial effects on motor functions in this patient population.

Declaration of funding source – no funding.
Disclosure of interests – none.

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Kineziterapijos vandenyje poveikis vaikų, sergančių cerebriniu paralyžiumi, motorinėms funkcijoms. Sisteminė apžvalga

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SANTRAUKA

Tyrimo pagrindimas. Cerebrinis paralyžius (CP) yra vienas labiausiai paplitusių vaikystės sutrikimų. Skirtingos gydymo strategijos yra taikomos tam, kad pagerinti pacientų gyvenimo kokybę.

Tikslas – sistemingai apžvelgti naujausius straipsnius ir išanalizuoti vandens terapijos poveikį vaikų, sergančių cerebriniu paralyžiumi, motorinėms funkcijoms.

Metodai. Buvo atrinkti 2012–2022 m. tyrimai, kuriuose tiriamas vandens terapijos poveikis CP sergančių vaikų motorinėms funkcijoms. Naudotos duomenų bazės „Google Scholar“, „PubMed“ ir „PEDRO“. Atrankos kriterijai apėmė CP diagnozę, vandens intervencijos naudojimą, dalyvius iki 18 metų amžiaus, patvirtinto rezultatų matavimo, paskelbto anglų kalba, naudojimą ir tyrimo planą kaip atsitiktinių imčių kontrolinį, bandomąjį ir atvejo tyrimą.

Rezultatai. Iš 11 šiai apžvalgai atrinktų tyrimų 6 buvo atsitiktinių imčių kontroliniai tyrimai, 2 – beveik eksperimentiniai tyrimai, 2 – lyginamieji tyrimai, o vienas – atvejo tyrimas. Vandens pratimai, Halliwick koncepcija, Watsu ir vandens panardinimo terapija, plaukimo pratimai buvo naudojami vandens intervencijos tyrimuose. Gross Motor Function Measure (GMFM) buvo dažniausiai naudojama variklio funkcijų registravimo priemonė. Maždaug 64 proc. tyrimų parodė, kad vandens intervencijos gali turėti reikšmingai teigiamą poveikį vaikų, sergančių CP, motorinėms funkcijoms, palyginti su įprastine terapija arba be intervencijos.

Išvada. Vandens terapija teigiamai veikia vaikų, sergančių cerebriniu paralyžiumi, motorines funkcijas.

Raktažodžiai: cerebrinis paralyžius, vandens terapija, vandens pratimai, plaukimo programa, motorinės funkcijos.

Gauta 2022 07 07

Priimta 2022 09 13