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ORIGINAL ARTICLE

Effectiveness of Watsu therapy in patients with juvenile idiopathic arthritis. A parallel, randomized, controlled and single-blind clinical trial

Efectividad de la terapia Watsu en pacientes con artritis idiopática juvenil. Un ensayo clínico controlado paralelo, aleatorio y simple ciego

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Abstract

Introduction: Juvenile idiopathic arthritis (JIA) is a rheumatologic disease in children under 16 years old, which causes early physical disability. The use of hydrotherapy Watsu in these patients is proposed. **Objective:** To evaluate the effectiveness of Watsu compared to conventional hydrotherapy on health-related quality of life (HRQoL), functional health status, pain, and ranges of joint motion in patients with acute or subacute JIA. **Patients and Method:** Randomized (1:1) single-blind parallel controlled clinical trial in 46 patients with acute and subacute JIA between 8-18 years old. Pediatric Quality of Life Inventory 4.0 (PedsQL4.0), Childhood Health Assessment Questionnaire (CHAQ), and 10-joints Global range of motion score (GROMS) assessments were used at the beginning, post-treatment, and after three months of follow-up. Patients were randomly assigned to the Watsu group (n = 24) and to the conventional hydrotherapy group (n = 22), participating in 10 sessions of 45 minutes once a week. **Results:** Watsu therapy showed statistically significant improvements in physical functioning-HRQoL (p = 0.041), disability index (p = 0.015), distress index (p = 0.015), and functional health status-CHAQ (p = 0.013) after treatment compared to conventional hydrotherapy. **Conclusions:** Watsu therapy improved HRQoL, pain sensation, and functional health status compared to conventional hydrotherapy. Methodological adaptations are required in future studies to improve the external validity of these results.

Keywords:
Juvenile Idiopathic Arthritis;
Autoimmune Diseases;
Rehabilitation;
Hydrotherapy;
Watsu

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Introduction

Juvenile idiopathic arthritis (JIA) is the most common rheumatic disorder in childhood and it appears as a persistent inflammation of one or more joints in children under 16 years of age for a period longer than 6 weeks[1-4].

This disease has seven independent entities: Systemic arthritis, polyarticular with rheumatoid factor, polyarticular with negative rheumatoid factor, oligoarticular (persistent or extended), enthesitis-related arthritis, psoriatic arthritis, and undifferentiated arthritis, which appears with different forms of presentation, clinical signs, and symptoms, laboratory tests and genetic basis[2,5-7]. This situation makes it difficult to diagnose and treat early, which can lead to premature physical disability due to the presence of severe joint damage in the first two years of illness[1,2]. This damage is accompanied by muscle weakness, pain, decreased joint mobility, and limitations in daily activities[4,8,9]. However, early treatment can decrease and prevent this situation[1,10].

The main objective of therapeutic interventions in children and adolescents with JIA is to achieve clinical remission, along with preventing structural damage and the onset of symptoms, maintaining good functional ability, and promoting physical and psychological well-being[1,3,11].

The achievement of these objectives requires an integral and multidisciplinary approach, which includes pharmacological interventions (non-steroidal anti-inflammatory drugs, corticosteroids, disease-modifying drugs, biological agents, among others), and integral rehabilitation[1,3,6]. This rehabilitation seeks to educate the patient and family, control pain and inflammatory status, maintain joint ranges of motion, muscle strength, physical condition, and adequate psychological status, along with reintegrating the child with JIA into their occupational and recreational activities[1], with different health professionals participating in this process.

In the physical therapy area for JIA, the use of hydrotherapy is recommended due to its positive effects on joint range of motion, pain, and inflammation control during the acute phase[1,10,12,13], and improvement in muscle strength, function, cardiovascular condition, social interaction, and independence in the subacute and remission phases[10]. Its mechanism of action is based on the physical properties of water (buoyancy, viscosity, thermal conductivity, and hydrostatic pressure) that facilitate joint movement, promote muscle relaxation, control the inflammatory process, and diminish the pain sensation[14,15].

In 2008, a systematic review was published on the effects of exercise in patients with JIA[16], where improvements were observed without statistical significance in functionality, quality of life, joint range of motion, aerobic capacity, and the number of swollen joints. Regarding hydrotherapy, only one study showed statistically significant results in reducing the number of inflamed joints[17], however, the used treatment protocols focused on active muscle exercises, stretching, and play[18] which are limited in children with pain in the acute or subacute phase.

In these children, it is proposed to use an aquatic relaxation therapy called Watsu (Water-Shiatsu), which consists of passive movement sequences, muscle stretching and massages during assisted immersion in warm water[19,20]; however, this therapy has not previously been used in this population.

Studies with limited evidence have described the use of Watsu in people with stroke[20], cerebral palsy[21], and fibromyalgia[22,23]; which was effective in the latter in reducing pain, improving depression[22] and health-related quality of life (HRQoL)[23].

In this context, this randomized controlled clinical study is conducted to evaluate the effectiveness of Watsu therapy in improving HRQoL, functionality, joint range of motion and pain sensation in a population of children and adolescents diagnosed with acute or subacute JIA compared to conventional hydrotherapy.

Patients and Method

Study design

It is a randomized controlled clinical trial, of parallel groups, with ratio 1:1 and simple blind, that was approved by the Scientific Ethical Committee of the *Sociedad Pro Ayuda del Niño Lisiado - Teletón* (Certificate Nº 7/2012).

Participants

The patient population was determined by searching the database and reviewing clinical records, of which patients diagnosed with JIA at the Teleton Institute (TI) Santiago were included in the study between 2012 and 2015, aged 8 to 18, in the acute or subacute phase (given by sensation of pain, joint swelling, and functional deficit during the last three months before the intervention), who had a medical indication for hydrotherapy and who agreed to participate in the study by signing a consent by the child and informed consent by the legal guardian.

Patients who presented the following symptoms before the start of the study were excluded: sensation of pain, swelling or functionality limitation due to external causes to JIA (surgeries or trauma), intercurrent diseases (respiratory diseases, inflammatory disease of the ear, skin lesions, and infections), urinary and/or intestinal incontinence, and fear of water.

Interventions

This study considered two parallel groups, previously randomized, where the study group received a Watsu therapy protocol and the control group received a conventional hydrotherapy protocol. Both protocols had a duration of 10 sessions, once a week, with 45-minute sessions.

a) ***Watsu:*** The patients received a protocol of passive movement sequences, stretches, and massages, belonging to the "Transition Flow" of Watsu therapy[19] (Table 1).
b) ***Hydrotherapy:*** The patients received a hydrotherapy protocol for arthritis, adapted from the proposal of Epps et al.[18], consisting of stretching, strengthening exercises, and swimming (Table 1).

In both groups, the treatment was carried out by physiotherapist with experience in rehabilitation of physically disabled people at TI Santiago. In the case of Watsu therapy, the therapist had 163 hours of practical training, certified by the Institut für Aquatische Körperarbeit (IAKA) and the Chilean Aquatic Bodywork Federation.

60% or more adherence to the total scheduled treatment in each patient was considered as accomplished treatment. In addition, the continuity of their routine treatments was accepted, such as scheduled admissions to regular physiotherapy, occupational therapy, and changes in their pharmacological dosage due to ethical considerations.

Outcome measures

HRQoL, functional health status, sensation of pain, and joint ranges of passive motion were evaluated in both groups in the previous, subsequent and 3-month follow-up periods. The professionals in charge of carrying out the measurements were a psychologist and two physiotherapists trained in the use of each evaluation instrument.

Main outcome

Health-related quality of life: The Pediatric Quality of Life Inventory Scale (PedsQL 4.0 Generic Core Scale) was used, which measures HRQoL in people aged 2 to 18, healthy or with a chronic health condition, and it is validated for the Chilean population[24]. This scale evaluates the child's physical, emotional, social, and school performance domains[25], giving a 0 to 100% HRQoL score.

Table 1. Group treatment Watsu and conventional hydrotherapy protocols.

Sessions	Watsu therapy	Sessions	Conventional hydrotherapy
Basic movements Sessions 1 - 2	Dance and cradle of breathing, accordion (simple-rotation), sacral offering, head and hip release, column massage, dynamic spiral rotation, coffee grinder (big-small) and bell-rocking chair	First stage Sessions 1 – 4	Warm up of 5 minutes with swimming or walking in the pool, followed by global muscle stretches (3 repetitions, 20 seconds duration) and muscle strengthening analytical exercises for restricted movements or muscle weakness. (30 repetitions of each exercise). It concludes with a free swim
Algae and free flowing Sessions 3 – 4	Algae movements, rib snake and wave, followed by stillness, exploration of autonomous movements, side by side (infinity) and accordions		
Under head Session 5	Movements of the sequence algae, followed by Hara travel, massage in the spine type fan, stillness and accordions	Second stage Sessions 5 – 8	Warm up of 10 minutes of swimming or walking in the pool, followed by global muscle stretches (10 repetitions, 5 seconds duration) and analytical exercises for muscle strengthening at a higher speed (60 repetitions of each exercise). It concludes with 5 minutes of global exercises for upper and lower limbs (4 sets of 10 repetitions)
Cradle of the heart Session 6	Cradle of breathing, followed by movements of bullfighter, statue of liberty, dolphin of heart and accordions		
Head cradle Session 7	Basic movements followed by arm and hand massage, fly with inner leg, arm-leg cradle, knee cradle, moving twist and free play		
Under hip Session 8	Cradle of respiration, followed by archer, pelvic wave, autonomous movements, slide - pull and accordions		
Figure 4 Session 9	Basic movements followed by internal leg rotation, sinusoidal curve, leg movement in 8, parachute, figure 4, foot and spine massage	Third Stage Sessions 9 – 10	Warm up of 10 minutes of swimming or walking in the pool, followed by muscle stretches (10 repetitions, of 5 seconds duration) and speedy muscle strengthening analytical exercises and associated with the use of resistive movement elements (90 repetitions of each exercise). It concludes with 5 minutes of global exercises for lower and upper limbs (4 sets of 10 repetitions).
Chair Session 10	Basic movements followed by spine massage, wave, open chair, tango, searching for the stars and free play of the head		

Secondary outcomes

a) ***Functional health status:*** Defined as the effect of JIA on the ability to perform common tasks[9] and measured through the Childhood Health Assessment Questionnaire (CHAQ). This questionnaire is used in patients with JIA between 1 and 19 years of age[26], validated in Chile in 2001[27]. It has a disability index (which contains questions of functionality in daily activities), discomfort, and health status. The results were turned into a score from 0 to 3 which is translated into absence of disability or maximum functional disability respectively[26, 27].

b) ***Sensation of pain:*** Pain was measured by the discomfort index present in CHAQ[26]. This initially used a numeral scale from 0 to 100 (from no pain to maximum pain) to represent the perceived sensation of pain, which was then changed into a score from 0 to 3 of the global questionnaire.

c) ***Joint ranges of motion:*** The 10-joints Global Range of Motion Scale (GROMS) was used, which evaluates 10 passive movements considered essential for functionality, such as elbow flexion, wrist extension, general mobility of proximal metacarpophalangeal and interphalangeal joints (from the second to the fifth finger), thumb flexion and abduction, hip flexion-extension, and knee flexion-extension. It uses a score from 0 to 1, where 1 is normal joint range in all 10 joints[28, 29]. However, this scale has not been used previously in clinical studies, but its creators state that its results would be related to those obtained in CHAQ[28].

Sample size

It was not determined since we used the total population of patients with JIA from the TI Santiago who met the inclusion criteria and agreed to participate in the study.

Randomization

a) ***Sequence generation:*** A simple randomization method was performed in groups of 10 patients, with ratio 1:1, after accepting to participate in the study.

b) ***Assignment concealment mechanism:*** The patient's personal information was hidden using an identification code (ID), then assigned to the Watsu and conventional hydrotherapy groups using a random number generator (nosetup.org). This information was put into sealed envelopes, which were given to the patient and/or legal guardian.

Implementation

The methodological team of the Research and Development Administration Teletón performed the sequence of random assignment and interventions, and the principal investigator carried out the registration of participants.

Blinding

The evaluators who performed each outcome measurement (pre-intervention, post-intervention, and follow-up) were blind to randomization and assignment of participants to study groups. However, given the evident differences in interventions (Watsu and conventional hydrotherapy), patients and physiotherapists who administered the therapies were not blinded.

Statistical methods

The data were recorded in an Excel spreadsheet and processed using the statistical software SPSS v17.0. Summary measures were calculated for study variables, Student's T-test was used for means, and Pearson's chi-square to determine differences in age, gender, and type of JIA between groups.

Shapiro-Wilk normality test was performed. Variables comparisons between groups were made using Kruskal-Wallis and Mann-Whitney tests, and variables differences within each study group at baseline, post-treatment and follow-up were analyzed with Friedman and Wilcoxon tests. $P<0.05$ was considered a statistically significant difference. Data were analyzed on an 'intention-to-treat' basis, so the dependent variables of all randomized patients were included in the analysis.

Results

Participant flow

231 JIA patients aged 8-18 years were found in the TI Santiago database (2012-2015), and 59 of them met the inclusion criteria. Out of these, 46 agreed to participate and signed informed consent and/or assent, and then were assigned by simple randomization in Watsu (n = 24) and hydrotherapy (n = 22).

During the intervention process, five cycles of parallel treatment were carried out, between June 2013 and December 2015, concluding the intervention phase at the end of 2015, due to the lack of new patients who met the inclusion criteria.

In the 2013-2015 period, 16 patients interrupted their treatment (34.78% of total loss) due to the presence of intercurrent diseases, scheduling problems, and family issues (Figure 1). This recorded loss in both the Watsu group (n = 8; 33% loss) and conventional hydrotherapy (n = 8; 36% loss) did not present statistically significant intergroup differences (p = 0.537).

Clinical and demographic characteristics

The study participants presented homogeneity between the Watsu and hydrotherapy groups, in terms of age and subtype of JIA. The mean age was 13.17 ± 3.02 years for the Watsu group and 12.68 ± 3.00 years for the conventional hydrotherapy group, without statistically significant intergroup differences (p = 0.880). According to JIA subtype, there was a greater presence of polyarticular JIA (26.1%), undifferentiated JIA (26.1%), and oligoarticular JIA (19.6%) in the total number of participants and no significant differences were observed in the intergroup analysis (p = 0.454).

On the other hand, most of the study participants were female (76.1%), however, there were statistically significant differences (p = 0.038) in grouping patients by gender in the study groups, with a higher number of males concentrated in the Watsu group. (Table 2).

Main result

Regarding health-related quality of life measured through PedsQL4.0, Watsu therapy presented a statistically significant difference in the physical functioning sub-dimension at basal level (p = 0.028), and a statistically significant post-intervention improvement (p = 0.041) compared to conventional hydrotherapy.

In the intra-group evaluation, Watsu therapy obtained significant differences in improvement in the psychosocial health sub-dimension between baseline evaluation and follow-up (p = 0.021). Conventional

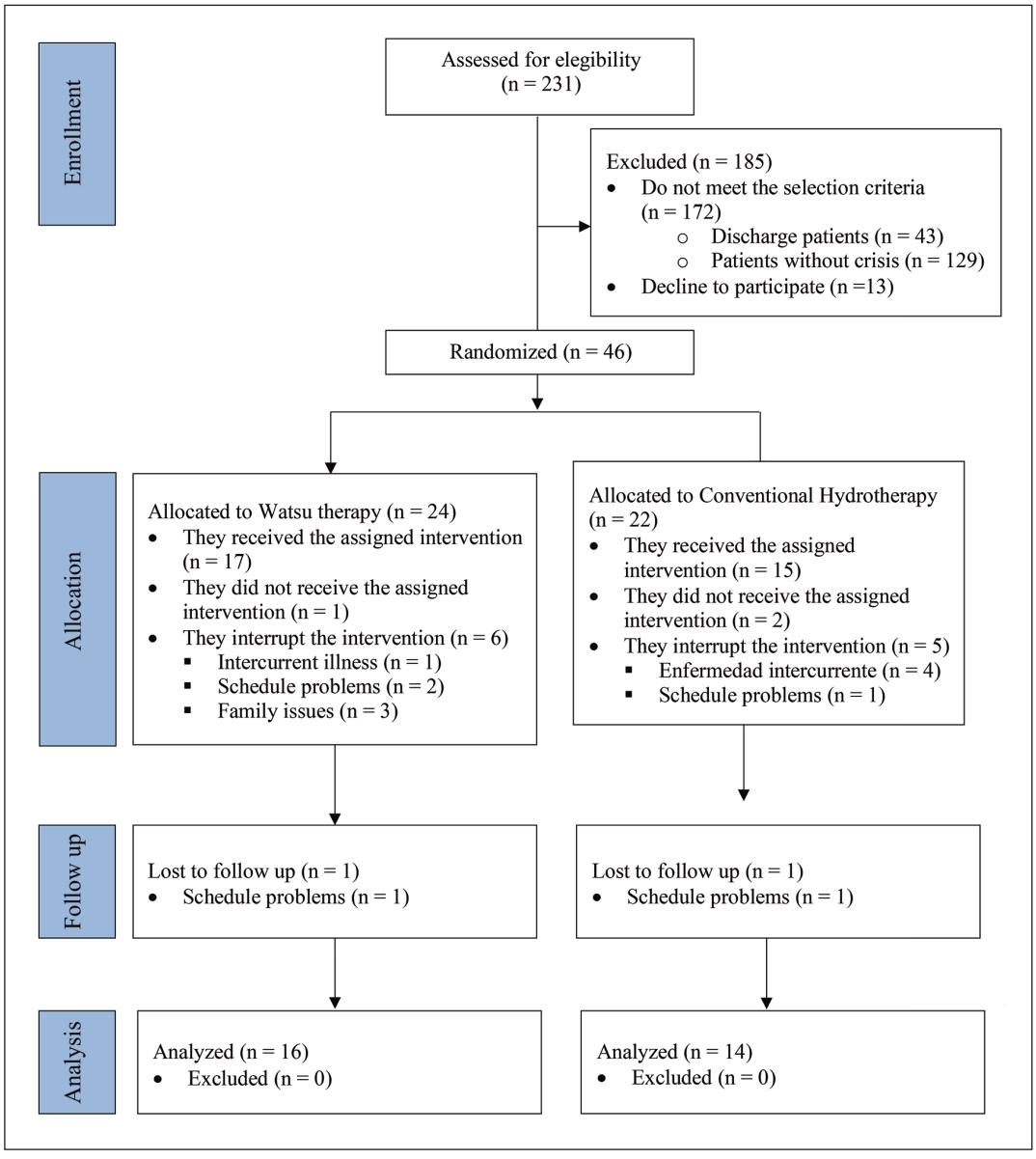

Figure 1. Diagram of the flow of patients during the execution of the randomized clinical trial (Based on CONSORT, 2010).

hydrotherapy showed no significant intra-group differences in sub-dimensions or overall quality of life scores (Table 3).

Secondary results

a) Functional health status and sensation of pain: Upon application of the Childhood Health Assessment Questionnaire (CHAQ), Watsu therapy obtained statistically significant improvements in the post-intervention evaluation of the disability index (p = 0.015), discomfort index (p = 0.031), health status index (p = 0.013), and total CHAQ score (p = 0.003) compared to conventional hydrotherapy.

In the intra-group evaluation of each CHAQ index, no statistically significant differences were observed in the disability index in the Watsu or hydrotherapy group (Table 4). In the discomfort index, Watsu therapy obtained a statistically significant improvement in post-intervention evaluation (p = 0.007), in contrast, in the health status index, Watsu therapy obtained a statistically significant deterioration between post-intervention evaluation and follow-up (p = 0.012). On the other hand, the health status index of conventional hydrotherapy showed statistically significant improvements between post-intervention evaluation and follow-up (p = 0.033), and deterioration between baseline evaluation and follow-up (p = 0.017).

Finally, in the CHAQ total value, Watsu therapy showed a statistically significant improvement in functional health status between baseline and post-intervention evaluations (p = 0.004) and a statistically significant deterioration of the same variable between post-intervention and follow-up evaluations (p = 0.039) (Table 4).

b) Range of motion: In the 10-joints Global Range of Motion Scale (GROMS) evaluation, there were no statistically significant differences between the Watsu and hydrotherapy groups (Pre-intervention p = 0.794; Post-intervention p = 0.190, and follow-up p = 0.383).

Table 2. Clinical and demographic baseline characteristics of the study groups

Characteristics	Watsu		Conventional hydrotherapy		Total		Differences between groups p-value
	n	%	n	%	n	%	
I. Gender							
Male	9	37.5	2	9.1	11	23.9	0.038*
Female	15	62.5	20	90.9	35	76.1	
II. JIA type							
Polyarticular	7	29.2	5	22.7	12	26.1	0.454
Asociated with entesitis	6	25.0	2	9.1	8	17.4	
Oligoarticular	5	20.8	4	18.2	9	19.6	
Undifferentiated	4	16.7	8	36.4	12	26.1	
Systemic	2	8.3	2	9.1	4	8.7	
Psoriatic	0	0.0	1	4.5	1	2.2	
III. Age							
Mean ± SD	13.17 ± 3.02		12.68 ± 3.00				0.880

*Statistical significance. JIA: Juvenile idiopathic arthritis; SD: standard deviation.

Table 3. Health-related quality of life (HRQoL) in each study group measured with Pediatric Quality of Life Inventory Scale (Peds QL 4.0 Generic Core Scale)

		Watsu			Friedman Test		Conventional hydrotherapy			Friedman Test	
Assessment		n	Min-Max	Me (IR)	χ^2	p-value	n	Min-Max	Me (IR)	χ^2	p-value
PEDS	Physical functioning 1	23	18.75-87.50	46.88 (18.75)	2.550	0.280	19	15.63-81.25	34.38 (28.13)	0.585	0.746
	Physical functioning 2	16	34.38-90.63	56.25 (27.34)			14	12.50-100.00	39.06 (40.63)		
	Physical functioning 3	16	18.75-90.63	53.13 (25.78)			13	6.25-100.00	37.50 (67.19)		
	Psychosocial health 1	23	21.67-83.33	55.00 (35.00)	9.750	0.008*	19	26.67-80.00	51.67 (26.67)	0.190	0.909
	Psychosocial health 2	16	25.00-93.33	62.50 (22.50)			14	21.67-95.00	53.33 (20.83)		
	Psychosocial health 3	16	46.67-96.67	68.33 (15.00)			13	16.67-95.00	65.00 (30.00)		
	Health-related quality of life 1	23	30.43-84.78	51.09 (30.43)	4.222	0.121	19	22.83-72.83	47.83 (22.83)	0.326	0.850
	Health-related quality of life 2	16	33.70-92.39	57.61 (27.72)			14	19.57-96.74	50.54 (24.18)		
	Health-related quality of life 3	16	43.48-90.22	64.13 (21.74)			13	13.04-96.74	48.91 (40.76)		

*Statistical significance. Me (IR): Median (interquartile range). 1 = Basal; 2 = Post-intervention y 3 = Follow-up.

Table 4. Functional health status (CHAQ), its index (disability, discomfort and health status) and range of motion (GROMS) in each study group

		Watsu			Friedman Test		Conventional hydrotherapy			Friedman Test	
Assessment		n	Min-Max	Me (IR)	χ^2	p-value	n	Min-Max	Me (IR)	χ^2	p-value
CHAQ	Disability index1	24	0.00-2.63	1.63 (0.69)	3.500	0.174	22	0.13-2.63	1.81 (1.31)	0.491	0.782
	Disability index 2	16	0.00-2.10	1.25 (1.03)			15	0.00-2.40	2.00 (0.60)		
	Disability index 3	16	0.25-2.25	1.25 (1.28)			14	0.00-2.75	1.69 (1.81)		
	Discomfort index 1	24	0.03-3.00	1.54 (1.07)	3.380	0.185	22	0.15-2.85	1.16 (1.10)	0.036	0.982
	Discomfort index 2	16	0.00-1.70	0.90 (0.83)			15	0.00-2.50	1.40 (1.30)		
	Discomfort index 3	16	0.09-2.52	1.16 (1.01)			14	0.00-2.61	1.53 (1.82)		
	Health status index 1	24	0.00-2.70	1.22 (1.49)	3.610	0.164	22	0.00-2.73	1.29 (1.34)	7.245	0.027*
	Health status index 2	16	0.00-1.77	0.59 (1.00)			15	0.06-2.49	1.38 (1.32)		
	Health status index 3	16	0.00-2.01	1.28 (0.96)			14	0.00-2.22	1.11 (1.43)		
	CHAQ 1	24	0.50-2.38	1.55 (1.27)	7.630	0.022*	22	0.20-2.68	1.34 (0.92)	1.000	0.607
	CHAQ 2	16	0.05-1.85	0.90 (0.81)			15	0.02-2.28	1.56 (0.61)		
	CHAQ 3	16	0.11-1.93	1.40 (0.96)			14	0.00-2.19	1.52 (1.60)		
GROMS	GROMS 1	22	0.70-0.94	0.79 (0.06)	4.305	0.116	19	0.48-0.91	0.81 (0.10)	2.286	0.319
	GROMS 2	17	0.75-0.96	0.83 (0.10)			14	0.68-0.91	0.80 (0.11)		
	GROMS 3	15	0.69-0.94	0.84 (0.05)			14	0.66-0.93	0.80 (0.12)		

*Statistical significance. Me (IR): Median (interquartile range). 1 = Basal; 2 = Post-intervention y 3 = Follow-up.

In the intragroup evaluation, Watsu therapy significantly improved the range of motion between baseline and post-intervention evaluation (p = 0.023). (Table 4)

Adverse effects

No adverse events related to therapeutic interventions were reported by study participants or their legal guardians.

Discussion

Watsu therapy improved the physical functioning sub-dimension of HRQoL (PedsQL4.0), disability index, discomfort, health status, and total functional health status score (CHAQ) in children and adolescents with acute and subacute JIA.

There was no statistically significant difference between Watsu and conventional hydrotherapy in the assessment of joint ranges of motion (GROMS).

In the intra-group evaluation, the effectiveness of Watsu therapy presented a variable duration, representing immediate improvements post-intervention (GROMS and CHAQ) or during follow-up (psychosocial health - PedsQL4.0), in contrast, a deterioration was observed in the health status index and total functional health status (CHAQ) during follow-up. This situation can be interpreted as limited effectiveness of Watsu only to the intervention period in joint function and ranges of motion, but a long-term improvement in the psychosocial health of the patient.

In the case of conventional hydrotherapy, the values of HRQoL and joint ranges of motion did not vary with the intervention, however, the health status index (CHAQ) worsened between baseline and follow-up evaluations, and only improved between post-intervention and follow-up evaluation, which could indicate that conventional hydrotherapy based on active and resistance exercises in patients with acute and subacute JIA may be counterproductive.

Literature advises that any type of treatment aimed at JIA should improve disease activity at three months and achieve its therapeutic goal at six months[11]. In the case of Watsu, the therapy duration may have been not enough to achieve all the proposed therapeutic objectives, therefore, it is suggested to increase the therapy duration in future studies aimed at patients with acute or subacute JIA, in order to assess the effectiveness of the intervention in the short, medium and long term.

However, these results should be analyzed with caution, as the target studied population (acute and subacute JIAs) is a smaller percentage of the total JIA patients (25% of the target population), and the presence of functional disability and pain generates at the same time more restrictions on patient participation in the study. This is ratified by 34.78% of total loss of patients, mainly due to family problems in the Watsu therapy group and intercurrent disease in the conventional hydrotherapy group.

Given this situation, there is literature regarding the barriers perceived by parents and patients with JIA to adhere to different therapeutic interventions, which hinder the achievement of positive long-term

effects[30,31]. Favier et al. identified that forgetting to attend therapy, the sensation of pain, and the belief that therapy is not necessary are the main barriers to adherence and that both the use of measurements of these barriers and actions that facilitate adherence are vital to achieving a better quality of life in these patients[31].

Regarding the clinical and demographic characterization of the study population, a higher number of women was observed in both groups, which is related to the literature[3,7], however, there were differences in the number of men between the Watsu and hydrotherapy groups that did not affect the values resulting from the PedsQL4.0[32] and CHAQ[33] scales.

Concerning the main result, there was a statistically significant baseline difference between the Watsu group and hydrotherapy in the physical functioning sub-dimension (PedsQL4.0). The presence of this difference could be due to the clinical and genetic heterogeneity of the seven subtypes of JIA, favoring this variability. In fact, it is established that JIA is not an individual disease, but a heterogeneous group of disorders, with differences in their clinical phenotype, course of the disease, and pathophysiology[11]. Given this heterogeneity, it is proposed that future studies consider stratified random sampling by type of JIA and gender rather than simple sampling, as this could decrease the resulting variability.

Finally, we consider that performing a high level of evidence study design in a pediatric rheumatic population such as the JIA is a great challenge, given the complexity of meeting the methodological requirements in terms of feasibility and results generalization[34]. This is due to JIA is still considered a rare disease given its low prevalence[7] and the emphasis on studying the effectiveness of pharmacological therapies mainly through this type of design. In addition, studies using Watsu therapy are scarce and have a low level of evidence[20,22,23,35-37], therefore, further research is needed on different biopsychosocial and interdisciplinary strategies for intervention in this disease that can promote the control and management of symptoms, along with promoting clinical remission.

Conclusions

Watsu therapy improves HRQoL in the short term related to physical functioning, sensation of pain, disability index, and functional health status compared to conventional hydrotherapy in patients with acute or subacute JIA.

The limited number of participants and the heterogeneity of their baseline clinical condition hinder the external validity of the study results. For future studies, it is proposed to increase the intervention period with Watsu therapy, to perform randomized sampling stratified by type of JIA and sex, along with adding instruments that measure the barriers to adherence to treatment perceived by children and their families, in order to improve the methodological level of the studies, promote adherence to treatment, and favor long-term remission status.

Ethical Responsibilities

Human Beings and animals protection: Disclosure the authors state that the procedures were followed according to the Declaration of Helsinki and the World Medical Association regarding human experimentation developed for the medical community.

Data confidentiality: The authors state that they have followed the protocols of their Center and Local regulations on the publication of patient data.

Rights to privacy and informed consent: The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the correspondence author.

Conflicts of Interest

Authors declare no conflict of interest regarding the present study.

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