

Office of Evidence Based Practice – Specific Care Question: Aquatic Therapy for Duchenne Muscular Dystrophy

Specific Care Question:

For the child with Duchenne muscular dystrophy (DMD) is aquatic therapy efficacious in improving functional ability.

Question Originator:

Natasha Curry, DPT

Plain Language Summary from The Office of Evidence Based Practice: Summary:

This summary is a compilation of studies reviewed to answer the above specific care question. Data was obtained from two systematic reviews. The evidence in the included systematic reviews is of Very Low quality. There is no evidence that specifically evaluates the use of aquatic therapy in the care of children with DMD. Further, from the included studies, aquatic therapy was equally effective as land based therapy. Undesirable effects were not reported. A recommendation is not made to use aquatic therapy to improve outcomes specific to DMD, however, a recommendation is made to use aquatic therapy to alter the environment therapy is provided and to increase sensory stimulation. Other alternative therapies may be equally reasonable.

EBP Scholar's Responsible for Analyzing the Literature:

Nancy Allen, MS, RD, LD, MLS

Search Strategy and Results:

PEDro Database: repeated Jan 2015

CINAHL

(MH "Muscular Dystrophy+") OR "muscular dystrophy" (MH "Swimming") OR "swimming" (MH "Aquatic Sports+") (MH "Bathing and Baths") OR (MH "Bathing (Iowa NIC)") S2 OR S3 OR S4 S1 AND S5 (MH "Hydrotherapy+") OR (MH "Aquatic Exercises") OR (MH "Balneology") OR (MH "Water+") S4 OR S7 June 2013, repeated Jan 2015

Google Scholar:

Jan 2015- All papers that referenced (Getz, Hutzler, & Vermeer, 2006)

Studies included in this Review:

Getz, M., Hutzler, Y., & Vermeer, A. (2006).
Franzen, K., & Trynieszewski, P.(2013)
Dimitrijevic et al, (2012)

Studies Not Included in this Review with Rationale for Exclusion:

Simmons, C. (2008) Spinal cord injury
Hudson, P. A. et al. (2008) Case study on limb girdle muscular dystrophy
Duval, E., & Terp, K. (2008) Survey, did not use a validated tool

Method Used for Appraisal and Synthesis:



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The Cochrane Collaborative computer program, Review Manager (RevMan 5.1.7) was used to synthesize the two included studies.

Updated Jan 21 2015

Characteristics of Included Studies:

Tables:

Dimitrijević 2012

Methods

RCT

Participants

Children with cerebral palsy Hospital based therapy, in Serbia

Number Randomized: 29

Number Who Completed: 27

Gender: Intervention group 71% male Control group: 54% male

Inclusion Criteria: between 5-14 years, ability to understand instruction, no medical contraindications, no botulinum toxin treatment or surgery in the preceding three months, written parental approval

Exclusion Criteria:

Power Analysis:

Intervention: Intensive swimming program for 6 weeks, one to one time with the instructor. All tests were performed three times, at the beginning, the end and at 3 weeks post intervention

Aquatic intervention N= 14 Control N= 13.

Interventions

Aquatic intervention- 10 minutes of warm up in the water, 40 minutes of exercise swimming techniques and 5 minutes of play

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Outcomes	Control therapy is not clearly described Gross Motor Function Measure 88 (GMFM 88). It is reliable and valid
Notes	Water Orientation Test Alyn 2 (WOTA 2) It is reliable and valid For the WOTA 2 test, the authors did not compare the intervention group to the control group; they only compared pre aquatic therapy to post aquatic therapy. Measures in the inventory improved after therapy at 6weeks, but not at 9 weeks. It is unknown if the improvement was greater with the aquatic therapy versus the control treatment (no therapy)

Risk of bias table

Bias	Scholars' Judgment	Support for Judgment
Random sequence generation (selection bias)	Unclear risk	Just state "randomly divided" do not describe process
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias)	High risk	The primary investigator plus 3 other therapists preformed the therapy
Blinding of outcome assessment (detection bias)	High risk	It is unclear if the researcher performing the therapy also did the test assessments
Incomplete outcome data (attrition bias)	Unclear risk	Two subjects dropped out from the aquatic therapy, reason unknown
Selective reporting (reporting bias)	Unclear risk	
Other bias	Low risk	Not detected

Franzen 2013

Methods	Systematic Review
Participants	Studies since the Getz 2006 SR (included in this synthesis)



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17 of 28 articles were included in the systematic review (only 2 RCTs)

Study selection criteria:

- Children with neuromotor impairments
 - Cerebral palsy
 - Developmental delay/disability
 - Juvenile rheumatoid arthritis
 - Prader-Willi syndrome
 - Developmental coordination disorder
 - Autism spectrum disorder
 - Asperger's disorder
 - Rett syndrome
 - Spinal Muscular Atrophy

Included children as young as 6 months

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No predominant type of aquatic therapy identified

Interventions

Length of interventions ranges from 6 weeks to 8 months
36 different tests were used as outcomes. Uncertain if all are validated tests.

Outcomes

Sample size ranged from 1-37 subjects.

Notes

17 articles were selected. The authors rated the quality of the evidence as moderate, but using the Review Manager tools for assessing for bias, the studies would all be decreased for risk of bias due to inability to blind participants and outcome assessors, no randomization or concealment of allocation. They state intention to treat analysis was performed, but in a non-randomized study, this cannot be so.

Unable to group outcomes across studies due to the wide variety of tests, surveys, tools used to assess change in the included studies.

GRADE: Although the authors of this review state the evidence is of moderate- low quality, GRADING the evidence for this specific question downgrades it to VERY LOW quality.

- The risk of bias in the included studies is high (see above),
- The inconsistency among studies is great:
 - (a) No study includes children with Duchenne muscular dystrophy, which is the population of interest for this synthesis,
 - (b) Many tests were used to assess change across studies,
 - (c) Not all measures used measure function, the primary outcome of interest in this synopsis
 - (d) The sample size is very small, which leads to results with low precision.

Although the authors state there was statistical significance, it appears that most tests for significance are before and after measures, not aquatic therapy vs. no aquatic therapy measures.

No harm was reported with aquatic therapy and no study has been reported in children with Duchenne muscular dystrophy. It is unknown if the effects seen in children with impairments in this report can be applied to Duchenne MD. Therefore the recommendation to use it based on aquatic therapy being as

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effective as land based therapy and therapy can be done in a fun environment with increased sensory stimulation is supported.

Getz 2006

Methods
Participants

Systematic Review

11 of 173 articles were included. See background section of RevMan

Range of Selected Studies: Population	Number of	Number of subjects	Mean age (years)
Rett syndrome	1	1	11
Neurological dysfunction	1	1	0.8
High risk infants	1	3	0.3
Cerebral palsy	5	114	19
Hemiplegia		35	
Double hemiplegia		3	
Diplegia		45	
Triplegia		2	
Quadriplegia		21	
Ataxia/athetosis		8	
Muscular dystrophy	3	54	7
SMA type II		31	
SMA type III		20	
Progressive muscular dystrophy		3	

Interventions

Most articles used the Halliwick method and adapted swimming lessons
Length of interventions ranged from once a week for 6 weeks to 11 months

Outcomes

- Biometrics
- Gross Motor Functional Measure
 - Vital capacity
 - Stereotypical movement analysis
 - Functional hand usage



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- Hand skills
- Gait and balance
- Range of motion
- Muscle strength
- Heart rate
- Blood pressure

Psychosocial measures including

- Leisure's Activity inventory
- Rosenberg's Self-esteem Scale Functional Independence Measure of Children (WeeFIM)
- Marinek-Zaickowsly Self-Concept Scale
- Brazelton Neonatal Behavioral Assessment Scale

Notes

Eleven articles were selected. Six were rated < 3 on a rating scale of 1-5 where lower is better. More than half of the included studies were case reports, or cohort studies with non-standard included therapies.

Of the outcomes listed above, only Vital capacity was found to be significantly better in the children who underwent aquatic therapy. Although there was improvement in children who received this therapy, it was not significantly better.

GRADE: Based on very low quality evidence, Biometric and psychosocial measures are not improved in children with neuromuscular impairments after undergoing aquatic therapy. As higher quality evidence becomes available, the signal may change.

References

- Dimitrijevic, L., Aleksandrovic, M., Madic, D., Okicic, T., Radovanovic, D., & Daly, D. (2012). The effect of aquatic intervention on the gross motor function and aquatic skills in children with cerebral palsy. *Journal of Human Kinetics, 32*, 167-174.
- Duval, E., Terp, K. (2008). The relationship between aquatic therapy, ambulation abilities and power wheelchair utilization in males with Duchenne's muscular dystrophy. *The Journal of Aquatic Physical Therapy, 16*(1), 16.
- Franzen, K., & Tryniszewski, P. (2013). *Effectiveness of aquatic therapy for children with neurodevelopmental disorders: A systematic review of current literature*. Retrieved from Sage College Libraries electronic collection.
- Getz, M., Hutzler, Y., & Vermeer, A. (2006). Effects of aquatic interventions in children with neuromotor impairments: a systematic review of the literature. *Clin Rehabil, 20*(11), 927-936. doi: 20/11/927 [pii]10.1177/0269215506070693



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Hudson, P. A., Boone, K., Drogos, J., Husted, C., Stephens, H., & Thorpe, D. (2008). Aquatic intervention for an adolescent with muscular dystrophy. *Pediatric Physical Therapy*, 20(1), 109-110.

Simmons, C. (2008). Effects of aquatic treadmill training on over-ground walking for community ambulators with incomplete spinal cord injury. *The Journal of Aquatic Physical Therapy*, 16(1), 18-19.