Effects of aquatic interventions in children with neuromotor impairments: a systematic review of the literature

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CRD summary
The authors concluded that there was insufficient evidence to evaluate the effects of aquatic interventions in children with neuromotor impairments. There were limitations to this review but, overall, the authors’ conclusions about there being insufficient evidence are likely to be reliable.

Authors’ objectives
To evaluate the effectiveness of aquatic interventions in children with neuromotor impairments.

Searching
MEDLINE, PubMed, ERIC, PsycINFO, PEDro, SIRC, CINAHL and the Cochrane CENTRAL Register were searched from 1966 to January 2005; the search terms were reported. In addition, the Aquatic Therapy Research Bibliography was searched to 1999. Only articles published in English were eligible.

Study selection
Study designs of evaluations included in the review
Inclusion criteria were not specified in terms of the study design.

Specific interventions included in the review
Studies that evaluated aquatic programmes were eligible for inclusion. Where reported in the included studies, most aquatic interventions used the Halliwick method and adapted swimming lessons. The duration of the interventions ranged from 6 weeks to 2 years; most sessions lasted 30 minutes and were most commonly repeated twice a week. The majority of studies used individualised sessions.

Participants included in the review
Studies of children (aged 0 to 18 years) with neuromotor or neuromuscular impairments were eligible for inclusion. The included participants were aged between 2 months and 19 years, although the review also included one study in which ages ranged from 1 to 40 years on the grounds that most were within the eligible age range. The participants in the included studies were mainly children with cerebral palsy and most had diplegia or hemiplegia; other studies included children with muscular dystrophy, Rett syndrome or neurological dysfunction and high-risk infants.

Outcomes assessed in the review
Inclusion criteria were not specified in terms of the outcomes. The included studies measured outcomes using a variety of measures such as body functions, activity level and participation.

How were decisions on the relevance of primary studies made?
Two reviewers independently selected the studies.

Assessment of study quality
The authors did not state that they assessed validity. Some aspects of study quality were discussed, including the reliability and validity of outcome measures. Two reviewers did dependently grade studies using a hierarchy of study design: level 1 studies were randomised controlled trials (RCTs); level II studies were non-randomised controlled trials (including prospective cohort studies with concurrent controls); level III studies were cohort studies with historical controls or case studies with control groups; level IV studies were case series with no controls and case reports; and level V studies were case reports or used non-empirical methods. A third reviewer checked the grades and consensus was reached.

Data extraction
The data were extracted onto a standardised form, but the authors did not state how many reviewers performed the data extraction.

**Methods of synthesis**

How were the studies combined?
The numbers of studies reporting positive outcomes were reported for reported outcomes.

How were differences between studies investigated?
Differences between the studies were mentioned in the text.

**Results of the review**

Eleven studies (n=173) were included: one level I study (an RCT, n=20), two level II studies (n=46 in each), three level IV studies (n=56) and five level V studies (n=5). Similarities between the level II studies strongly suggest they are reporting the same study.

Six studies reported the reliability and validity of outcome measures.

Improvements associated with aquatic interventions were found for body functions (5 studies), with a statistically significant improvement found in vital capacity (1 study).

Improvements were also found for the following outcomes, although the statistical significance was not reported: gross and fine motor skills (1 study), gait and manual skills (2 studies), gross motor function and swimming skills (2 studies), bimanual coordination (1 study) and improvements in neonatal rating scale (1 study).

Improvements were also found for communication skills and social interactions (1 study). One of two studies measuring self-esteem reported an improvement associated with the aquatic interventions; the other study reported no statistical difference in self-esteem. One study reported no statistical differences in self-concept.

The RCT compared two different aquatic interventions and reported no significant difference in functional independence between treatments.

**Authors' conclusions**

There was insufficient evidence to evaluate the effects of aquatic interventions in children with neuromotor impairments.

**CRD commentary**

The review addressed a clear question that was defined in terms of the participants and intervention; inclusion criteria were not defined for the outcomes or study design. One study that did not meet the inclusion criteria for participants was also included. Several relevant sources were searched but no specific attempts were made to minimise publication or language bias. Methods were used to minimise reviewer error and bias in the selection and grading of studies, but it was unclear whether similar steps were taken in the extraction of data. Study validity was not assessed, so the results from these studies and any synthesis may not be reliable. In view of the diversity of the studies, the narrative synthesis was appropriate. However, the results were presented as the number of studies reporting improvements with aquatic interventions regardless of study quality or sample size. There were limitations to this review but, overall, the authors' conclusions about there being insufficient evidence are likely to be reliable.

**Implications of the review for practice and research**

Practice: The authors did not state any implications for practice.

Research: The authors stated that good-quality research is needed to evaluate aquatic interventions.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.