Horseback riding as therapy for children with cerebral palsy: is there evidence of its effectiveness?

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CRD summary
This poorly reported review concluded there was some evidence that hippotherapy improved muscle symmetry in the trunk and hip, but therapeutic horseback riding was no more effective than other therapies for improving muscle tone in children with cerebral palsy. Given the potential for error or bias during the review process, these cautious conclusions may not be reliable.

Authors' objectives
To appraise the evidence on the effectiveness of hippotherapy and therapeutic horseback riding on impairments, activities and participation in children with cerebral palsy.

Searching
The following databases were searched from inception to 2005: MEDLINE, PsycINFO, CINAHL, Current Contents, ERIC and HealthSTAR. Search terms were reported. Relevant organisations were contacted to obtain bibliographies of articles in the area. References of retrieved articles were also scanned. Only full peer-reviewed papers published in English or German were considered.

Study selection
Studies that assessed hippotherapy or therapeutic horseback riding for children with cerebral palsy were eligible for inclusion. Eligible study designs included randomised controlled trials (RCTs), quasi-experimental and observational studies. Included studies were required to have been published in a peer-reviewed journal. Abstracts and conference proceedings were excluded.

Hippotherapy was commonly defined as being provided by a physiotherapist or occupational using equine movements to improve balance, posture, gross and fine motor skills. Therapeutic horseback riding was defined as being provided by a riding instructor to teach a disabled rider basic skills to control the horse. Studies addressing mechanical saddle riding were excluded.

Included studies were RCTs, quasi-experimental (repeated measures within subjects) and observational case series of children with cerebral palsy receiving hippotherapy or therapeutic horseback riding. Control interventions were waiting list or not described. The intervention was delivered in varying session lengths (eight minutes to one hour), and most commonly once or twice a week. Overall duration of the intervention ranged from eight weeks to six months. The population mean age ranged from four to 12 years, where reported. The level of cerebral palsy covered was mild, moderate, severe and spastic, where reported. Outcomes were measured using a variety of tools, with little overlap between studies.

The authors did not state how many reviewers performed the study selection.

Assessment of study quality
The randomised controlled trials (RCTs) were assessed using the PEDro (Physiotherapy Evidence Database) rating scale which gives an overall rating out of 10 points based on items covering: random allocation, baseline comparability, concealed allocation, blinding, analysis and follow-up. Where RCTs were already entered into the PEDro database with quality scores, these were used. PEDro scores were interpreted as follows: 9 to 10 rating = excellent; 6 to 8 rating = good; 4 to 5 rating = fair; below 4 rating = poor. Cohort and case control studies were assessed using the Newcastle-Ottawa Scale (selection, comparability and outcome criteria) giving a maximum of nine stars. Case series did not appear to have been assessed for validity.

RCTs were assessed by two reviewers and discrepancies resolved by discussion or recourse to a third reviewer. The
authors did not state how many reviewers performed the quality assessment for the other study types.

**Data extraction**
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

**Methods of synthesis**
The included studies were combined a narrative synthesis, divided according to intervention (hippotherapy or therapeutic horseback riding), then by outcomes of interest; body functions and structure; activities and participation. Study details were also presented in tables. Overall conclusions were presented using a modified levels of evidence approach, which took into account the quality of the evidence supporting the intervention.

**Results of the review**
A total of nine studies (n=108 participants) were included in the review: three randomised controlled trials (RCTs, n=48 participants), four quasi-experimental and two descriptive studies. Two RCTs were described as fair (PEDro score of 4) and one RCT was described as poor (PEDro score of 3). Newcastle-Ottawa Scale scores for the quasi-experimental studies ranged from five to six stars. As noted earlier, there was considerable variation in the type of intervention, duration and frequency of sessions.

**Hippotherapy** (five studies): One fair quality RCT and two quasi-experimental repeated measures studies showed statistically significant improvements in body functions and structure outcomes following hippotherapy. One descriptive study of two participants showed improvements in trunk coordination. Two quasi-experimental studies reported statistically significant improvements of hippotherapy on activity outcomes, while a descriptive study of two participants reported a positive trend.

**Therapeutic horseback riding** (four studies): Three studies reported on body function and structure outcomes after therapeutic horseback riding. One fair quality RCT found no significant changes in muscle tone compared to "regular therapy" or waiting list control. One poor quality RCT found significant improvement following therapeutic horseback riding in one measure of motor control (grasp), but non-significant results for posture and global behaviour. A case series found improvements in trunk co-ordination. Two studies reported statistically significant improvements in activities as measured by the gross motor functional measure dimension E (walk, jump, run). One was a fair quality RCT and the second was a repeated measures quasi-experimental design.

**Authors' conclusions**
There was some evidence from 'fair' quality RCTs that hippotherapy had short-term positive effects on muscle symmetry in the trunk and hip, but therapeutic horseback riding was no more effective than other therapies for improving muscle tone in children with cerebral palsy.

**CRD commentary**
This review addressed a clear question based on reasonable inclusion criteria, but these could have been more specific with regard to outcome measures and length or duration of the intervention. The searches were fairly broad, but did not include EMBASE (a key European database) and, given the exclusion of abstracts/conference proceedings and lack of attention to the grey literature, publication bias may have been introduced to the review. The authors did not report how many reviewers carried out study selection and data extraction, so reviewer error and/or bias cannot be ruled out. Comprehensive quality assessment was carried out (in duplicate for RCTs only) and the results were incorporated into the synthesis. Given the heterogeneity of the primary data, a narrative synthesis was appropriate. Appropriate conclusions were drawn based on the better quality evidence. The authors did highlight the small sample sizes and limited generalisation of the patient samples. Given the potential for error and bias in the review process, these cautious conclusions may not 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 future research should explore specific types of riding therapies for children, grouped by age and gross motor abilities. Further research should also consider child and family satisfaction, and the impact of therapeutic riding on participation.

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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.