The effect of growth hormone treatment or physical training on motor performance in Prader-Willi syndrome: a systematic review

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CRD summary
This review concluded that, in children/adults with Prader-Willi syndrome, growth hormone treatment had a positive effect on motor performance (not demonstrated in all studies). Physical training seemed to improve motor performance and health status. Given the limited quality of available data and small study sizes, the authors' conclusions should be treated with caution; their recommendations for further research seem appropriate.

Authors' objectives
To report an overview of motor performance studies in Prader-Willi syndrome, and to assess the effects of growth hormone treatment and of physical training programmes on motor performance. This abstract focuses on growth hormone treatment and physical training interventions.

Searching
PubMed, EMBASE, CINAHL and PsycINFO were searched from January 1980 to July 2011. Search terms were reported. Only studies published in English and with an available abstract were eligible. Reference lists of relevant papers were checked.

Study selection
Studies that assessed the effect of growth hormone treatment or physical training on motor performance in patients with Prader-Willi syndrome were eligible for inclusion. Case reports on one person or narrative reviews were excluded.

The included studies were randomised controlled trials (RCTs), controlled clinical trials, cohort studies, case series and observational. In growth hormone studies, most participants were children (aged 0 to 16 years), but one study was on adults (aged 20 to 33 years). In the physical training studies, most participants were adults but some were children (overall ages ranged from four to 42 years). In most studies, growth hormone treatment (for six months to six years) was compared with no growth hormone (co-enzyme Q10 in one study). The physical training programmes included muscle strength exercises, walking, swimming, dancing and cycling. The control treatments were not described. The intensity of programmes varied; duration was for two weeks to one year. Most studies also included a diet element and were carried out in residential settings. The outcomes were skill acquisition, activity level, physical fitness, fitness and muscle strength, weight and body composition.

Two reviewers selected studies for inclusion.

Assessment of study quality
Quality was assessed using a checklist covering randomisation, group definition, selection bias, group comparability, treatment procedure, blinding, control period, study duration, measurement procedure, comparability of treatment, confounding effects, loss of participants, and intention-to-treat analysis. The maximum score differed according to study design. For each study the percentage of maximum score for that particular study design was calculated.

Quality was assessed by two reviewers.

Data extraction
The authors did not state how many reviewers extracted data.

Methods of synthesis
Data were combined in a narrative format, grouped according to treatment and study design.

Results of the review
Twenty-one studies (493 participants) were included in the review. Eleven studies assessed the effects of growth hormone.
hormone (five RCTs, 193 participants; six other study designs, 143 participants) and 10 studies assessed physical training (other study designs, 157 participants). Study size ranged from eight to 54 participants.

Study quality ranged from 57% to 86% of total possible scores (for the particular study design). None of the studies clearly defined selection procedure. Three studies clearly reported on losses to follow-up. Intention-to-treat analysis was not reported clearly in any studies.

All three RCTs in infants reported a positive effect of growth hormone treatment on motor performance; of two other studies, one reported a beneficial effect and one reported no effect compared with co-enzyme Q10. Five studies were in children (two RCTs and three other studies); all reported some positive effects. Only one study reported on adults; this showed a positive effect.

Nine out of ten studies on physical training programmes reported beneficial effects in children and adolescents.

**Authors' conclusions**

Growth hormone treatment had a positive effect on motor performance, although not all studies demonstrated an effect. Physical training seemed to lead to improved motor performance and health status.

**CRD commentary**

The aims of this review were clearly stated in the inclusion criteria. The search was limited to English and to papers with an abstract, so it was possible that studies may have been missed. Language or publication bias may have affected the review. The methods of study selection and quality assessment were aimed at reducing possible reviewer error or bias; those for data extraction were not clear.

Quality was assessed using a checklist/score, although a useful table was presented detailing scoring for individual items. A narrative discussion of results appeared appropriate given the variation in studies characteristics. Although some RCTs were included (growth hormone treatment), little evidence appeared to be available and much of the included data came from studies of lower methodological design. The outcomes investigated/reported for growth hormone treatment only included those for motor performance. The authors did not mention whether studies reported other possible (adverse) effects or whether these were sought. Overall studies were small and many were of lower quality. The authors acknowledged that selection bias and losses to follow-up may have affected results.

Given the possibility of missed studies, the limited quality of the available data and small study sizes, the authors' conclusions should be treated with some caution; their recommendations for further research seem appropriate.

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

**Practice**: The authors suggested that a combination of growth hormone treatment and physical training was started as soon as possible, especially in infants, to improve motor development in Prader-Willi syndrome.

**Research**: The authors stated that longitudinal multidisciplinary studies were needed on all aspects of physical training and growth hormone treatment in patients with Prader-Willi syndrome (more detail reported in paper). Given the low incidence of the syndrome, the authors recommended international co-operation.

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