Seat inclinations affect the function of children with cerebral palsy: a review of the effect of different seat inclines

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CRD summary
This review evaluated the effects of seating inclinations on the postural control, muscle activity and upper extremity function of children with cerebral palsy. The authors concluded that the current literature is inconclusive, though there are some indications that neutral and anterior seat inclines can positively affect function. Despite some methodological limitations, the authors’ conclusions appear appropriate given the evidence presented.

Authors' objectives
To review the research on the effects of seating inclinations on the postural control, muscle activity and upper extremity function of children with cerebral palsy (CP).

Searching
CINAHL, MEDLINE, AMED, EMBASE, the Cochrane Library, ISI Web of Science and OTDBASE were searched for relevant studies published in English from 1990 to March 2006; the search terms were reported. In addition, relevant journals were handsearched and the reference lists of retrieved studies were examined for further relevant references.

Study selection
Research studies were considered eligible for the review if they investigated seating and postural management for children with any type of CP (mild to severe; spastic, athetoid and mixed). The included studies evaluated a range of seating inclinations in children with various types and severity of CP, measuring outcomes such as head control, postural control, arm and hand function, number of pathological movements and trunk extension.

Eligibility did not appear to be restricted by study design, with the inclusion of single-subject designs, single case series, longitudinal studies and between-group factorial designs.

The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The included studies were critically appraised according to guidelines produced by McMaster University for the critical review of quantitative studies. This included themes on study purpose, design, sample characteristics, intervention, outcomes, data analysis methods and findings.

The authors did not state how the validity assessment was performed.

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

Methods of synthesis
The studies were combined in a narrative, following the McMaster guidelines. Study findings were grouped by outcome: postural control, muscle activity or upper extremity function.

Results of the review
Ten studies (n=175) were included in the review. The sample sizes ranged from 1 to 61 participants. One study included children aged between 3 and 18 months; the remaining studies included children aged 2 to 16 years.

The studies provided conflicting evidence on the effects of seat inclination on function in children with CP.
Nine studies measured postural control. Three of the studies measuring this outcome recommended the use of posterior tilt, two of which reported improved head control. Two studies reported that back and trunk extension increased on an anterior seat base, which supported the findings of 2 studies that had reported that this helped improve the child's ability to sit up straighter. Three studies by the same group of authors reported that postural control was improved and pathological movements reduced by placing the line of gravity of the body anterior to the axis of rotation.

Three studies measured muscle activity. One study reported that lower extremity muscle activity was highest in the reclined position and lower in horizontal and anterior positions. A second study recommended a 10° anterior tilt, but also found that a 15° anterior tilt increased erector spine muscle activity.

Five studies measured upper extremity function. Two studies by the same group of authors reported significantly improved hand and arm function for children seated in a functional sitting position with a forward-tilted pelvis. In contrast, one study recommended a semi-reclined position to improve upper extremity function. However, a later study by the same authors in normally developing children found the forward tilting position was more efficient than horizontal or backward-tilted positions. One study reported that tilting of the seat surface did not significantly impact on performance of upper extremity motor tasks.

Authors' conclusions
The current literature is inconclusive. However, there are indications that neutral and anterior seat inclines positively affect function for children with CP. Individual assessment of seating ability and need is recommended for these children, rather than the adoption of a universal seat incline.

CRD commentary
The review question was broadly defined in terms of the participants, interventions and study designs of interest. A wide range of electronic databases and relevant journals were searched, though the restriction to English language studies might have introduced language bias. It was unclear whether the search was also restricted to published studies, so the potential for publication bias cannot be excluded. In addition, the authors did not describe any attempts to minimise the potential for error or bias in the study selection, validity assessment or data extraction of the included studies. Validity was assessed according to published guidelines but the score was not formally used in the synthesis, though some aspects of study validity and reliability (e.g. sample size) were discussed in the review. The use of a narrative synthesis seemed appropriate given the heterogeneity of the identified studies. The authors' conclusions appear appropriate given the evidence presented, but their reliability may be restricted by some of the limitations highlighted.

Implications of the review for practice and research
Practice: The authors stated that practitioners should evaluate children with CP on an individual basis and ensure that the equipment selected is modified to the individual.

Research: The authors stated that experimental designs with larger sample sizes and utilising similar outcome measures are needed. They added that future research should focus on linking the assessment of seat incline need with actual seat prescription and subsequent performance of the child, rather than on which kind of incline is best.

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Record Status
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