Effectiveness of adaptive seating on sitting posture and postural control in children with cerebral palsy

CRD summary
The review concluded no single intervention was shown to be more effective than others in improving sitting posture or postural control in children with cerebral palsy. The authors’ conclusions reflect the evidence presented. The poor quality of the evidence and small sample sizes should be considered.

Authors’ objectives
To evaluate the effectiveness of adaptive seating on sitting posture and postural control in children with cerebral palsy.

Searching
Eleven databases including MEDLINE, CINAHL, PEDro, DARE, Cochrane Central Register of Controlled Trials and Cochrane Database of Systematic Reviews were searched from 1980 to July 2007 for peer-reviewed articles published in English. Search terms were reported. Three relevant journals were examined to 2007.

Study selection
Studies of interventions involving adaptive seating for nonambulatory children with cerebral palsy (aged from birth to 20 years) were eligible for inclusion. Outcomes of interest were sitting posture and postural control. Studies of children with comorbidities unrelated to cerebral palsy were excluded. Studies that reported co-interventions were excluded.

Adaptive seating included saddle position, positional angle changes of the seat and/or backrest inclinations, seat inserts, external supports and modular seating systems. Participant ages ranged from 12 months to 20.8 years. Distribution of motor impairments included diplegia, triplegia and tetraplegia/quadriplegia. Most studies included participants with spasticity; other participants had dystonia or athetosis. Severity of motor impairment ranged from mild to moderate to severe but definitions varied.

Two reviewers independently selected studies for inclusion. Differences were resolved by discussion or by a third reviewer.

Assessment of study quality
Study quality was assessed using the American Academy for Cerebral Palsy and Developmental Medicine Quality Assessment Scale and the Single Subject Research Design quality scale. Scores were categorised as strong (6 or 7 points), moderate (4 or 5 points) or weak (3 or less).

Two reviewers independently assessed study quality. Discrepancies were resolved through discussion.

Data extraction
Data on outcome measures were extracted and classified according to the International Classification of Functioning, Disability and Health (CF) model.

Two reviewers independently extracted data. Disagreements were resolved by consensus.

Methods of synthesis
Data were combined in a narrative synthesis grouped by type of supportive seating and functional ability. Levels of evidence for each study were assigned using methods according to Sackett and Harris.

Results of the review
Fourteen studies (176 participants, range two to 23) were included in the review. Most studies were single group designs acting as their own control groups; two studies were experimental with separate control groups. The quality of four studies was classified as strong, seven studies as moderate and three studies as weak.
**Saddle position (three studies):** There was mixed evidence to support use of saddle seats. Single studies reported improved sitting postural control, no to slight improvements or a significant increase in sitting posture and postural control.

**Seat position angles (four studies):** Two studies supported use of an anterior tilt seat with improvements in trunk extensor muscle activity (one study) and improved trunk extension (one study) in children with cerebral palsy. One study reported increased lower limb stability with a posterior tilt and one study found evidence to support the use of zero degree tilt for optimal trunk extensor activity.

**Modular seating system (four studies):** Modular seating may improve postural control and duration of head control (three studies), decrease the number of pathological movements (three studies) and increase trunk extension (one study) in children with cerebral palsy.

Due to the small number of participants the authors reported that they were unable to draw conclusions on seat inserts (two studies; seven participants). One study reported on three-point supports.

**Functional ability:** Mixed effects on upper limb function as a result of adaptive seating were reported in four studies. One study reported an overall increase in mobility as a result of using a saddle seat. Parent perceived improvements in their child's social interaction and in parental ease of performing caregiving tasks were noted in two studies.

**Authors’ conclusions**
No single intervention was shown to be more effective than others in improving sitting posture or postural control in children with cerebral palsy. There was limited evidence to suggest whether improved sitting posture or postural control would lead to improved functional abilities.

**CRD commentary**
The review question was clear and inclusion criteria were defined. Several relevant sources were searched. The limitation of inclusion to peer-reviewed articles published in English meant some studies may have been missed. Study quality was assessed and results were reported for individual studies. Most studies were of moderate quality; only two used control groups for comparison. Appropriate methods to reduce reviewer error and bias were used throughout the review process.

A narrative synthesis appeared appropriate given the differences between studies in study design, interventions, participants and outcomes. The authors acknowledged some limitations in the evidence including the diversity of the studies, poor quality and small sample sizes.

The authors’ conclusions reflect the evidence presented. The poor quality of the evidence and small sample sizes should be considered.

**Implications of the review for practice and research**
**Practice:** The authors stated that adaptive seating should be individualised to meet each child’s needs because children with cerebral palsy have varied issues that limit their postural ability.

**Research:** The authors stated that future studies on the effects of adaptive seating should describe participants using standardised classification systems, report outcomes using standardised measures and have a robust research design with a larger sample size. Future studies should cover outcomes beyond posture and postural control to explore whether improvements led to improved functional skills and increased participation in the social roles of daily life.

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**Bibliographic details**

**PubMedID**
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.