Effects of visual feedback therapy on postural control in bilateral standing after stroke: a systematic review

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CRD summary
This review concluded that the addition of visual feedback therapy in bilateral standing to conventional therapy had no statistically significant effects on patients' weight distribution, postural sway, gait or gait-related activities. These conclusions appear appropriate given the evidence presented in the review.

Authors' objectives
To establish whether bilateral standing with visual feedback therapy (VFT) after stroke improves postural control compared with conventional therapy; and to evaluate the generalisation of the effects of VFT on gait and gait-related activities.

Searching
MEDLINE (via PubMed), the Cochrane CENTRAL Register, CINAHL, PEDro and DocOnline were searched for articles published in English, German or Dutch up to April 2005; the search terms were reported.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) and controlled clinical trials (CCTs) were eligible for inclusion in the review.

Specific interventions included in the review
Studies evaluating the effects of VFT compared with conventional treatment were eligible for inclusion. The feedback had to provide visual representations of the individual's centre of gravity or weight distribution between the paretic and non-paretic leg. Feedback was defined as a 'process by which a person uses biofeedback information to gain voluntary control over processes or functions that are primarily under autonomic control'.

Participants included in the review
Studies including adults suffering from stroke, as defined by the World Health Organization, were eligible for inclusion in the review.

Outcomes assessed in the review
The authors did not state any inclusion criteria relating to the outcomes, although they did state in their aims that they wanted to find the effects on postural sway, symmetry of weight distribution in bilateral standing, parameters of gait, and gait-related activities including activities of daily living.

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

Assessment of study quality
Two reviewers independently rated the included RCTs and CCTs according to the PEDro scale, which scores studies on 11 items rating internal and external validity. Any disagreements were resolved by consensus or by recourse to a third reviewer.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.
For each study, the effect size 'g' was calculated by dividing the difference in means between the groups by the population standard deviation.

**Methods of synthesis**
How were the studies combined?
A weighted summary effect size (SES) was calculated for the pooled studies. A fixed-effect model was applied; in the event of significant statistical heterogeneity, a random-effects model was used.

How were differences between studies investigated?
A sensitivity analysis for study design was performed if significant statistical heterogeneity was found between individual effect sizes.

**Results of the review**
Eight studies (n=214) were included in the review: 6 RCTs (n=128) and 2 CCTs (n=86).

The median PEDro quality score was 4 out of 10 items (range: 3 to 6).

A homogeneous non significant difference was found between VFT and conventional treatment on weight distribution while bilateral standing (3 studies; SES 0.40, 95% confidence interval, CI: -0.06, 0.86).

A homogeneous non significant difference was found between VFT and conventional treatment on postural sway in bilateral standing with eyes open (5 studies; SES 0.20, 95% CI: -0.12, 0.53).

A homogeneous non significant difference was found between VFT and conventional treatment on postural sway in bilateral standing with eyes closed (2 studies; SES 0.28, 95% CI: -0.18, 0.75).

A homogeneous non significant difference was found between VFT and conventional treatment on the 'timed up and go' test (2 studies; SES -0.14, 95% CI: -0.73, 0.45).

A homogeneous non significant difference was found between VFT and conventional treatment on gait speed (2 studies; SES 0.08, 95% CI: -0.97, 1.14).

**Authors' conclusions**
The additional value of visual feedback therapy in bilateral standing compared with conventional therapy showed no statistically significant effects on symmetry of weight distribution between paretic and non-paretic leg, postural sway in bilateral standing, gait and gait-related activities.

**CRD commentary**
The review question was supported by appropriate inclusion criteria relating to the participants, interventions and study designs. Multiple electronic databases were searched, although inclusion was restricted by language and there were no attempts to identify unpublished studies; this might have resulted in relevant studies being missed. In an attempt to minimise errors and bias, two independent reviewers undertook the study selection and validity assessment processes. Details of the included studies were tabulated. The authors' conclusions appear appropriate given the evidence presented in the review; however, the possibility of publication and language bias should be considered when interpreting the findings.

**Implications of the review for practice and research**
Practice: The authors stated that visual feedback therapy should not be favoured over conventional therapy.
Research: The authors stated that the question remains as to exactly how asymmetry in weight distribution while standing is related to balance control in patients with stroke. They stated the need for more high-quality and larger RCTs in stroke rehabilitation studies in the future.

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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.