The effect of vestibular rehabilitation on adults with bilateral vestibular hypofunction: a systematic review
Porciuncula F, Johnson CC, Glickman LB

CRD summary
The authors concluded that there was moderate-strength evidence that adults with bilateral vestibular hypofunction improved their gaze and postural stability, following exercise-based vestibular rehabilitation. There was a lack of evidence for sensory prosthetics. The authors' conclusions reflect the evidence presented, but may be overstated given the variation between interventions, and limitations in the included studies and review process.

Authors' objectives
To determine the strength of the evidence for vestibular rehabilitation for adults with bilateral vestibular hypofunction.

Searching
PubMed, CINAHL, and The Cochrane Library were searched, and the Internet was searched using Google Scholar, for studies in English, published in peer-reviewed journals between 1990 and 2010; an example search strategy was reported. Citations from key journals were also considered.

Study selection
Randomised controlled trials (RCTs), and prospective cohort or case-control studies, of vestibular exercises, balance training, patient education, community-based programmes or sensory prosthetics, for adults with bilateral vestibular hypofunction (without noted central nervous system lesion) were eligible for inclusion. Studies of patients with a mixture of diagnoses were eligible, if they reported the outcomes for bilateral vestibular hypofunction separately.

In the included studies, the cause of bilateral vestibular hypofunction varied, including aminoglycoside toxicity, childhood meningitis, ototoxicity, progressive neural degeneration, bilateral Ramsay Hunt syndrome, streptomycin poisoning, and idiopathic causes. Half of the studies were of exercise-based vestibular rehabilitation and half used sensory prosthetics. Most exercise-based rehabilitation involved eye or eye-head exercises, with gait stabilisation exercises. Comparators included isometric strengthening exercises and head-still neck-neutral saccadic eye exercises on a Ganzfeld. Sensory prosthetics involved feedback through headphones, electrotactile input through the tongue, cutaneous stimulation on the plantar aspect of the foot, or vibrotactile input onto the head and muscles of the torso. Comparators included placebo head- or trunk-directed vibrotactile feedback.

One reviewer selected studies for inclusion, and a second reviewer assessed any that the first reviewer was uncertain about; disagreements were resolved by a third reviewer.

Assessment of study quality
The American Association for Cerebral Palsy and Developmental Medicine’s tool was used to assess the risk of bias on seven domains. Scores of 3 or less indicated low quality, scores of 4 or 5 indicated moderate quality, and scores of 6 or 7 indicated high quality.

The authors did not state how many reviewers assessed study quality.

Data extraction
The data were extracted for the outcomes of interest, which related to the World Health Organization's International Classification of Functioning components of body structure and function (for example, biomechanical measures), activity (for example, gait speed), and participation (for example, frequency of falls).

The authors did not state how many reviewers extracted the data.

Methods of synthesis
A narrative synthesis was presented due to differences in the interventions and study designs.
Results of the review
Fourteen studies (327 patients; 164 with bilateral vestibular hypofunction) were included; four were RCTs, one was a prospective cohort study, and nine were case-control studies. Only one study was judged to be high quality; 10 were moderate quality and three were low quality.

Exercise-based interventions improved gaze stability (seven studies), postural stability (four studies) and self-perception of disability (one study). Mixed results were found for gait speed (three studies). Studies were of moderate-to-high quality.

Sensory prosthetics, using auditory feedback, improved stance postural control (two studies). Studies using vibrotactile feedback reported improvement in some tasks related to postural control and gaze stability but not all outcomes were improved, such as step reaction and trunk sway (three studies). One study of tongue electrotactile feedback demonstrated a reduction in sway and minimised periodic large amplitude postural perturbations, but this study did not meet any of the risk of bias criteria. Studies were of low-to-moderate quality.

Authors’ conclusions
There was moderate-strength evidence that adults with bilateral vestibular hypofunction improved their gaze and postural stability following exercise-based vestibular rehabilitation. There was a lack of evidence on outcomes relating to participation and activity. Sensory prosthetics were in the early phase of development.

CRD commentary
The review question and inclusion criteria were clear and several databases were searched. The restriction to studies in English may have excluded some relevant data. It was unclear whether efforts were made to reduce the potential for error and bias in the review process.

Only a basic assessment of study quality was performed. While most studies were judged to be of moderate quality, most of them had a risk of bias. A narrative synthesis was appropriate given the differences between interventions and study designs, but the synthesis was limited because few results, and their statistical significance, were provided. The review was also limited by the few participants in the included studies, which meant that some results could have been due to chance, rather than the interventions; all but one of the studies had 20 or fewer patients.

The authors' conclusions reflect the evidence presented, but may be overstated given the variation between interventions and the limitations of the included studies and review process.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that research was needed to explore the ways to translate the improvements observed at a body function level into activity and participation, and it should include outcome measures for postural stability. Research was needed to elucidate gait speed as a measure of balance in adults with bilateral vestibular hypofunction.

Funding
Not stated.

Bibliographic details

PubMedID
23302709

DOI
10.3233/VES-120464

Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Evidence-Based Medicine; Exercise Therapy; Gait; Humans; Postural Balance; Sensation Disorders /rehabilitation; Vestibular Diseases /rehabilitation; Vestibule, Labyrinth /physiology

AccessionNumber
12013035569

Date bibliographic record published
24/07/2013

Date abstract record published
27/08/2014

Record Status
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.