NKR 52_PICO1_Vestibular rehabilitation for Meniere

Characteristics of studies

Characteristics of included studies

Garcia 2013

Methods	**Study design:** Randomized controlled trial **Study grouping:** Parallel group
Participants	**Baseline Characteristics** Intervention 1 ● *Diagnosis*: definite Ménière's disease ● *Age*: 47.65, mean ● *Boys %*: 39.10 Control ● *Diagnosis*: definite Ménière's disease ● *Age*: 47.90, mean ● *Boys %*: 33.30 Overall ● *Diagnosis*: ● *Age*: ● *Boys %*: **Included criteria:** Patients of both genders, aged between 18 and 60 years, diagnosed with definite Ménière's disease by an ENT, and with complaints of dizziness in the disease's intercritical periods were enrolled in the study. **Excluded criteria:** Patients diagnosed with bouts of the disease by the ENT physician immediately before the beginning of the study were excluded, as were subjects with rheumatic diseases, uncontrolled high blood pressure, heart disease, severe visual involvement or decompensated involvement despite contact lenses, orthopedic disorders resulting in motion limitation or use of lower limb prostheses, psychia-tric disorders, individuals submitted to stem cell transplant, patients unable to comprehend and obey simple verbal commands or stand independently in an orthostatic posi-tion, subjects who drank alcohol 24 hours before the tests, patients submitted to balance rehabilitation programs in the six months prior to the study, subjects who missed three consecutive body balance rehabilitation sessions, and those who failed to follow the orientations proposed by the authors of the study. **Pretreatment:** No statistically significant differences were found between the groups in terms of age, gender, and duration, periodicity or time since onset of dizzy spells.
Interventions	**Intervention Characteristics** Intervention 1 ● *Description*: In addition to a similar diet and drug therapy, case group individuals performed stimulus-enriched exercises on the BRUTM. The balance rehabilitation module in the BRUTMwas made up of a virtual image emitter and 3D goggles to create situations that triggered dizzy spells or vertigo episodes or aided in the compensation of vestibular disorders17. Body balance rehabilitation included visual and somatosensory stimuli and the PTGTM module in the BRUTM, in three interactive training games on postural control, stability limit, and muscle coordination covering various motor tasks in varying degrees of difficulty. All patients were exposed to foveal (smooth pursuit and saccades), retinal (bars, tunnel, and optokinetic train) and sensory integration (vestibulo-ocular reflex, suppression of the vestibulo-ocular reflex, vestibular optokinetic re-flex) visual stimuli. Patient skill level and evolution aided in the setting up of the visual stimuli in terms of latency, duration, frequency, motion, and depth, in addition to serving as input on the progression of somatosensory stimuli and changes such as the surface patients had to stand on during the tests, from firm pads to foam pads of varying density; walking on the spot on a firm and a compliant surface; and bouncing on a swiss ball. Postural control improvements were observed when significant increases on stability limit values and significant reduc-tions on CoP area and BRUTM oscillation rates were seen after the intervention. ● *Length of treatment*: 12 sessions in total. Two sessions per week. 6 weeks in total. ● *Longest follow-up after end of treatment*: End of treatment Control ● *Description*: Subjects in the control group were given dietary recommendations and prescribed 48 mg/day of betahistine (one 24 mg dose every 12 hours). ● *Length of treatment*: 6 weeks ● *Longest follow-up after end of treatment*: End of treatment
Outcomes	*Disease severity, SD (Dizziness visual analogue scale)* ● **Outcome type**: ContinuousOutcome *ADL, SD* ● **Outcome type**: ContinuousOutcome *Stability limit, SD* ● **Outcome type**: ContinuousOutcome *CS/eyes closed, SD* ● **Outcome type**: ContinuousOutcome
Identification	**Country:** Brazil **Authors name:** Adriana Pontin Garcia **Institution:** Graduate Program on Human Communica on Disorders of the Federal University of São Paulo - Paulista Medical School (UNIFESP-EPM). (Professor in the Speech and Hearing Therapy Program at FMU). **Email:** evista@aborlccf.org.br **Address:** Av. Eng. Alberto de Zago s, no 897. São Paulo - SP. Brazil. CEP: 04675-085.
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "The 44 patients diagnosed with unilateral or bilateral definite Ménière's disease were divided into case and control groups according to a table with uniformly distributed random numbers produced by a computer program."
Allocation concealment (selection bias)	Unclear risk	Judgement Comment: Nothing mentioned
Blinding of participants and personnel (performance bias)	High risk	Quote: "Patients were informed of all treatment phases and of the occurrence of dizzy spells during the exercises, par- ticularly in the early sessions. They were also made aware of the importance of complying with the exercise regimen." Judgement Comment: There is nothing mentioned on blinding
Blinding of outcome assessment (detection bias)	High risk	Judgement Comment: Nothing mentioned on blinding
Incomplete outcome data (attrition bias)	Low risk	Judgement Comment: No apparent sources of bias
Selective reporting (reporting bias)	Low risk	Judgement Comment: No apparent sources of bias
Other bias	Low risk	Judgement Comment: No other apparent sources of bias

Yardley 2006

Methods	**Study design:** Randomized controlled trial **Study grouping:** Parallel group
Participants	**Baseline Characteristics** Intervention 1 ● *Diagnosis*: 120 ● *Age*: 58,0 ● *Boys %*: 27,5 Control ● *Diagnosis*: ● *Age*: 59.7 ● *Boys %*: 29,2 Overall ● *Diagnosis*: ● *Age*: 59,2 ● *Boys %*: 31,4 **Included criteria:** Members were eligible for participation if theyhad experienced symptoms of dizziness or imbalance over the past 12 months,had not had any severe vertigo attacks within the last 6 weeks, had consultedtheir GP to check there were no medical reasons why they should not take partin the trial, and could be contacted by post for the key stages of the trial. **Excluded criteria:** Members were excluded if they reported having a vestibular disorder otherthan Me´nie`re disease. **Pretreatment:**
Interventions	**Intervention Characteristics** Intervention 1 ● *Description*: Vestibular rehabilitation self-management booklet. The VR booklet explained in lay terms how inadequate central compensationcould contribute to symptoms and why balance training should facilitatehabituation. Details were given of daily balance training exercises tocarry out in the home and how to tailor these to the particular symptomsexperienced. Participants were encouraged to resume activities in their dailylives that they had avoided because of dizziness, to promote generalization of habituation. ● *Length of treatment*: 3 months ● *Longest follow-up after end of treatment*: End of treatment (3 months) and 6 months follow-up Control ● *Description*: Waiting list ● *Length of treatment*: 3 months ● *Longest follow-up after end of treatment*: End of treatment (3 months) and 6 months follow-up
Outcomes	*Quality of life, n (number of patients getting better)* ● **Outcome type**: DichotomousOutcome *Disease severity, SD (VSS-SF)* ● **Outcome type**: ContinuousOutcome *ADL, SD* ● **Outcome type**: ContinuousOutcome
Identification	**Sponsorship source:** Projekt grant from Ménière's Society **Country:** England **Authors name:** Lucy Yardley **Institution:** School of Psychology, University of Southhampton **Email:** L.Yardley@soton.ac.uk **Address:** School of Psychology, University of Southhampton. Highfield, Southhampton SO17, 1BJ, UK
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Judgement Comment: An independent research administratorallocated participants to the intervention arms using a computer randomizationprogram
Allocation concealment (selection bias)	High risk	Judgement Comment: and sent each participant a letter informing them which interventiongroup they had been assigned to
Blinding of participants and personnel (performance bias)	High risk	Judgement Comment: and sent each participant a letter informing them which interventiongroup they had been assigned to
Blinding of outcome assessment (detection bias)	High risk	Judgement Comment: and sent each participant a letter informing them which interventiongroup they had been assigned to
Incomplete outcome data (attrition bias)	Low risk	Judgement Comment: No apparent sources of bias
Selective reporting (reporting bias)	Low risk	Judgement Comment: No other apparent sources of bias
Other bias	Low risk	Judgement Comment: No other apparent sources of bias

Footnotes

Characteristics of excluded studies

Basta 2011

Reason for exclusion	Wrong patient population

Clendaniel 2010

Reason for exclusion	Wrong patient population

Cohen 2003

Reason for exclusion	Wrong patient population

Cohen 2004

Reason for exclusion	Wrong patient population

Cohen 2004a

Reason for exclusion	Wrong patient population

Dozza 2007

Reason for exclusion	Wrong patient population

Enticott 2008

Reason for exclusion	Wrong patient population

Faag 2017

Reason for exclusion	Wrong patient population

Giray 2009

Reason for exclusion	Wrong patient population

Krause 2005

Reason for exclusion	Wrong patient population

Krebs 2003

Reason for exclusion	Wrong patient population

Meli 2006

Reason for exclusion	Wrong patient population

Pavlou 2013

Reason for exclusion	Wrong patient population

Tsukamoto 2015

Reason for exclusion	Wrong patient population

Winkler 2011

Reason for exclusion	Wrong patient population

Yeh 2014

Reason for exclusion	Wrong patient population

Footnotes

Characteristics of studies awaiting classification

Footnotes

Characteristics of ongoing studies

Footnotes

Summary of findings tables

Additional tables

References to studies

Included studies

Garcia 2013

Garcia, Adriana Pontin; Gananca, Mauricio Malavasi; Cusin, Flavia Salvaterra; Tomaz, Andreza; Gananca, Fernando Freitas; Caovilla, Heloisa Helena. Vestibular rehabilitation with virtual reality in Meniere's disease. Brazilian journal of otorhinolaryngology 2013;79(3):366-74. [DOI: https://dx.doi.org/10.5935/1808-8694.20130064]

Yardley 2006

Yardley, Lucy; Kirby, Sarah. Evaluation of booklet-based self-management of symptoms in Meniere disease: a randomized controlled trial. Psychosomatic medicine 2006;68(5):762-9. [DOI: https://dx.doi.org/10.1097/01.psy.0000232269.17906.92]

Excluded studies

Basta 2011

Basta, D.; Ernst, A.. Vibrotactile neurofeedback training with the Vertiguard-RT-system. A placebo-controlled double-blinded pilot study on vestibular rehabilitation]. HNO 2011;59(10):1005-11. [DOI: https://dx.doi.org/10.1007/s00106-011-2346-4]

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Cohen 2003

Cohen, Helen S.; Kimball, Kay T.. Increased independence and decreased vertigo after vestibular rehabilitation. Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery 2003;128(1):60-70. [DOI: https://dx.doi.org/10.1067/mhn.2003.23]

Cohen 2004

Cohen, Helen S.; Kimball, Kay T.. Changes in a repetitive head movement task after vestibular rehabilitation. Clinical rehabilitation 2004;18(2):125-31. [DOI: https://dx.doi.org/10.1191/0269215504cr707oa]

Cohen 2004a

Cohen, Helen S.; Kimball, Kay T.. Decreased ataxia and improved balance after vestibular rehabilitation. Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery 2004;130(4):418-25. [DOI: https://dx.doi.org/10.1016/j.otohns.2003.12.020]

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Dozza, Marco; Wall, Conrad,3rd; Peterka, Robert J.; Chiari, Lorenzo; Horak, Fay B.. Effects of practicing tandem gait with and without vibrotactile biofeedback in subjects with unilateral vestibular loss. Journal of vestibular research : equilibrium & orientation 2007;17(4):195-204. [DOI:]

Enticott 2008

Enticott, J. C.; Vitkovic, J. J.; Reid, B.; O'Neill, P.; Paine, M.. Vestibular rehabilitation in individuals with inner-ear dysfunction: a pilot study. Audiology & Neuro-Otology 2008;13(1):19-28. [DOI: https://dx.doi.org/10.1159/000107434]

Faag 2017

Faag, Carina; Bergenius, Johan; Forsberg, Christina; Langius-Eklof, Ann. Feasibility and Effects of a Nursing Intervention for Patients with Peripheral Vestibular Disorders. Rehabilitation nursing : the official journal of the Association of Rehabilitation Nurses 2017;42(5):274-281. [DOI: https://dx.doi.org/10.1002/rnj.261]

Giray 2009

Giray, Murat; Kirazli, Yesim; Karapolat, Hale; Celebisoy, Nese; Bilgen, Cem; Kirazli, Tayfun. Short-term effects of vestibular rehabilitation in patients with chronic unilateral vestibular dysfunction: a randomized controlled study. Archives of Physical Medicine and Rehabilitation 2009;90(8):1325-31. [DOI: https://dx.doi.org/10.1016/j.apmr.2009.01.032]

Krause 2005

Krause E.. Vestibular training improves vertigo. MMW Fortschritte der Medizin 2005;147(3):22. [DOI:]

Krebs 2003

Krebs, David E.; Gill-Body, Kathleen; Parker, Stephen W.; Ramirez, Jose V.; Wernick-Robinson, Mara. Vestibular rehabilitation: useful but not universally so. Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery 2003;128(2):240-50. [DOI: https://dx.doi.org/10.1067/mhn.2003.72]

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Meli A.; Zimatore G.; Badaracco C.; De, Angelis E.; Tufarelli D.. Vestibular rehabilitation and 6-month follow-up using objective and subjective measures. Acta Oto-Laryngologica 2006;126(3):259-266. [DOI: http://dx.doi.org/10.1080/00016480500388885]

Pavlou 2013

Pavlou, Marousa; Bronstein, Adolfo M.; Davies, Rosalyn A.. Randomized trial of supervised versus unsupervised optokinetic exercise in persons with peripheral vestibular disorders. Neurorehabilitation and neural repair 2013;27(3):208-18. [DOI: https://dx.doi.org/10.1177/1545968312461715]

Tsukamoto 2015

Tsukamoto, Heloisa Freiria; Costa, Viviane de Souza Pinho; Silva, Rubens Alexandre da Junior; Pelosi, Gislaine Garcia; Marchiori, Luciana Lozza de Moraes; Vaz, Claudia Regina Sanches; Fernandes, Karen Barros Parron. Effectiveness of a Vestibular Rehabilitation Protocol to Improve the Health-Related Quality of Life and Postural Balance in Patients with Vertigo. International archives of otorhinolaryngology 2015;19(3):238-47. [DOI: https://dx.doi.org/10.1055/s-0035-1547523]

Winkler 2011

Winkler, Patricia A.; Esses, Barbara. Platform tilt perturbation as an intervention for people with chronic vestibular dysfunction. Journal of neurologic physical therapy : JNPT 2011;35(3):105-15. [DOI: https://dx.doi.org/10.1097/NPT.0b013e31822a2af9]

Yeh 2014

Yeh, Shih-Ching; Huang, Ming-Chun; Wang, Pa-Chun; Fang, Te-Yung; Su, Mu-Chun; Tsai, Po-Yi; Rizzo, Albert. Machine learning-based assessment tool for imbalance and vestibular dysfunction with virtual reality rehabilitation system. Computer methods and programs in biomedicine 2014;116(3):311-8. [DOI: https://dx.doi.org/10.1016/j.cmpb.2014.04.014]

Studies awaiting classification

Ongoing studies

Other references

Additional references

Other published versions of this review

Classification pending references

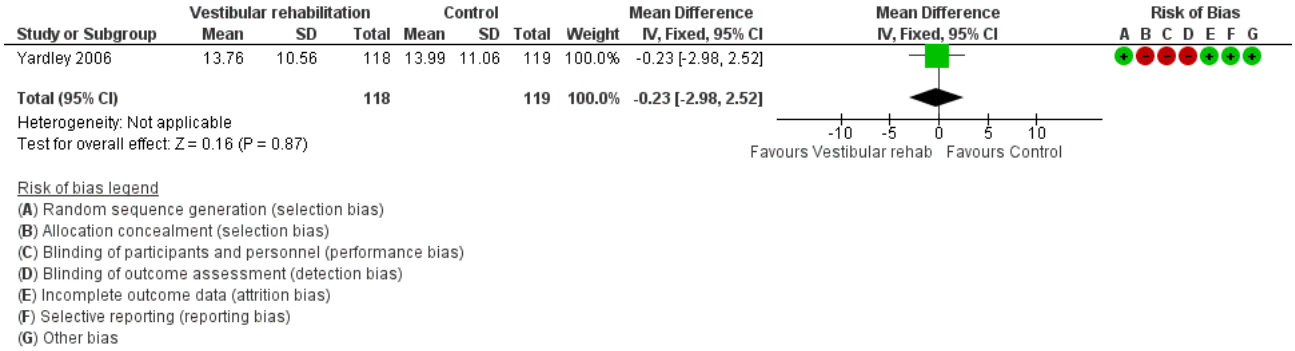
Data and analyses

1 Vestibular rehabilitation vs Control

Outcome or Subgroup	Studies	Participants	Statistical Method	Effect Estimate
1.1 Disease severity (VSS-SF). End of 3 months treatment	1	237	Mean Difference (IV, Fixed, 95% CI)	-0.23 [-2.98, 2.52]
1.2 Disease severity, (Dizziness visual analogue scale). End of 6 weeks treatment	1	44	Mean Difference (IV, Fixed, 95% CI)	-2.86 [-5.05, -0.67]
1.3 ADL (DHI). End of 6 weeks treatment	1	44	Mean Difference (IV, Fixed, 95% CI)	-25.51 [-38.66, -12.36]
1.4 ADL (DHI). End of 3 months treatment FU	1	237	Mean Difference (IV, Fixed, 95% CI)	-1.07 [-6.92, 4.78]
1.5 Posturography (stability limit). End of 6 weeks treatment	1	44	Mean Difference (IV, Fixed, 95% CI)	46.12 [9.68, 82.57]
1.8 Quality of life (Subjective health, number of patients getting better). End of 3 months treatment	1	240	Risk Ratio (IV, Fixed, 95% CI)	1.83 [1.17, 2.84]

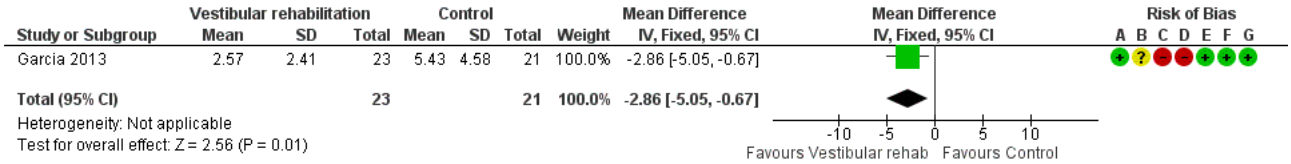
Figures

Figure 1 (Analysis 1.1)



Forest plot of comparison: 1 Vestibular rehabilitation vs Control, outcome: 1.1 Disease severity (VSS-SF). End of 3 months treatment.

Figure 2 (Analysis 1.2)

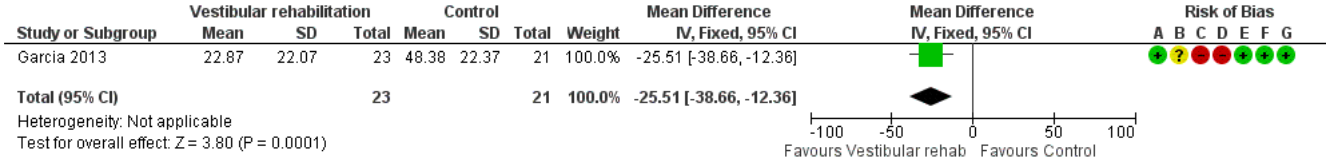


Heterogeneity: Not applicable
Test for overall effect: Z = 2.56 (P = 0.01)

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Selective reporting (reporting bias)
(G) Other bias

Forest plot of comparison: 1 Vestibular rehabilitation vs Control, outcome: 1.2 Disease severity, (Dizziness visual analogue scale). End of 6 weeks treatment.

Figure 3 (Analysis 1.3)

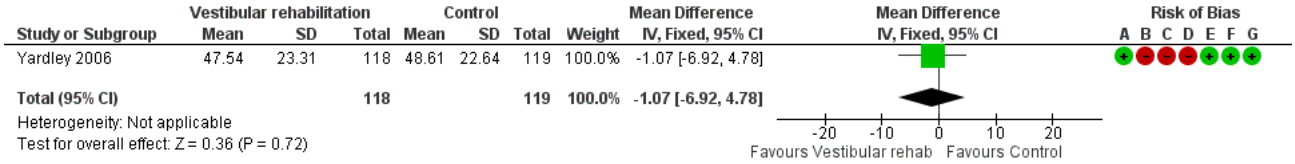


Heterogeneity: Not applicable
Test for overall effect: Z = 3.80 (P = 0.0001)

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Selective reporting (reporting bias)
(G) Other bias

Forest plot of comparison: 1 Vestibular rehabilitation vs Control, outcome: 1.3 ADL (DHI). End of 6 weeks treatment.

Figure 4 (Analysis 1.4)

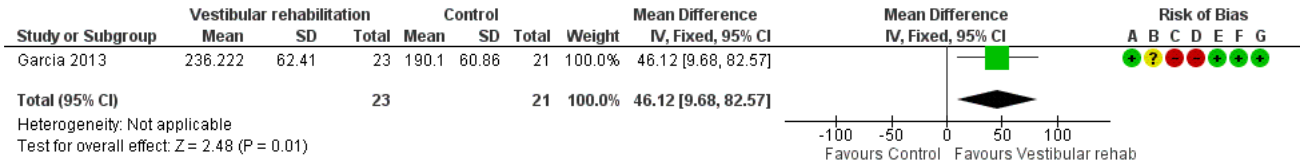


Heterogeneity: Not applicable
Test for overall effect: Z = 0.36 (P = 0.72)

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Selective reporting (reporting bias)
(G) Other bias

Forest plot of comparison: 1 Vestibular rehabilitation vs Control, outcome: 1.4 ADL (DHI). End of 3 months treatment FU.

Figure 5 (Analysis 1.5)

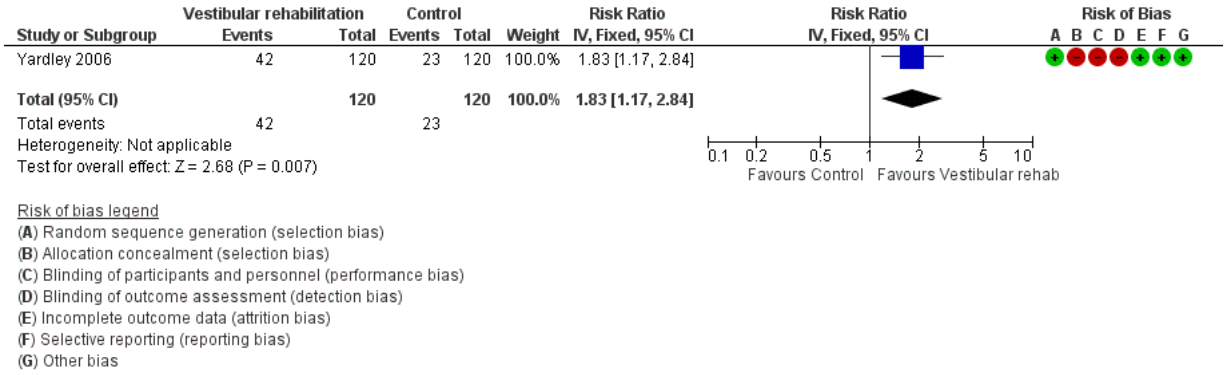


Heterogeneity: Not applicable
Test for overall effect: Z = 2.48 (P = 0.01)

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Selective reporting (reporting bias)
(G) Other bias

Forest plot of comparison: 1 Vestibular rehabilitation vs Control, outcome: 1.5 Posturography (stability limit). End of 6 weeks treatment.

Figure 7 (Analysis 1.8)



Risk of bias legend
(**A**) Random sequence generation (selection bias)
(**B**) Allocation concealment (selection bias)
(**C**) Blinding of participants and personnel (performance bias)
(**D**) Blinding of outcome assessment (detection bias)
(**E**) Incomplete outcome data (attrition bias)
(**F**) Selective reporting (reporting bias)
(**G**) Other bias

Forest plot of comparison: 1 Vestibular rehabilitation vs Control, outcome: 1.8 Quality of life (Subjective health, number of patients getting better). End of 3 months treatment.