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The effects of vestibular rehabilitation and dual-task training on balance and gait among stroke survivors: a meta-analysis

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Introduction

Stroke, the leading cause of adult disability in the developed world, often results in balance and mobility issues, affecting 85% of survivors.

Maintaining balance is complex, relying on integration of vestibular, visual, and somatosensory inputs to the central nervous system.

Vestibular rehabilitation therapy (VRT) improves the dynamic balance of stroke survivors, yet VRT is rarely included in stroke rehabilitation guidelines, and has not been explored with dual-task training (DTT).

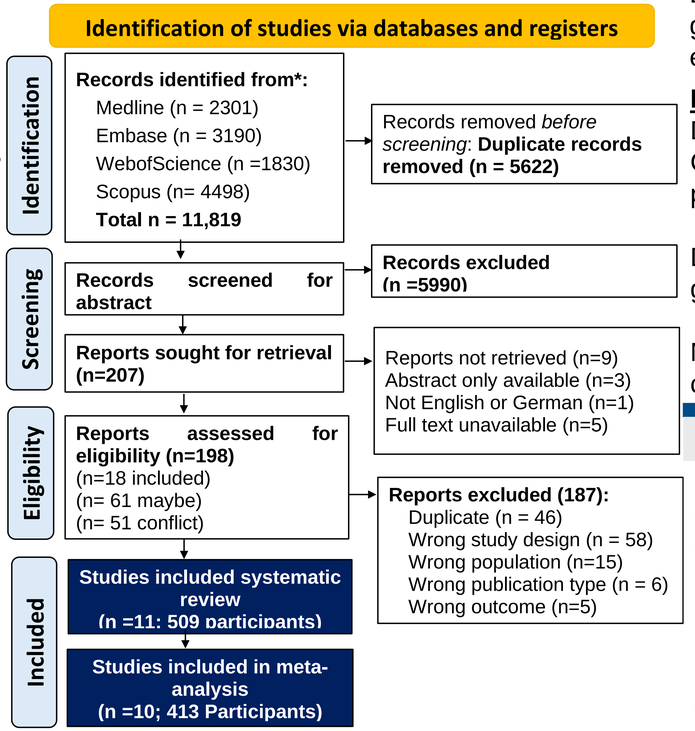
Objective & Methods

To explore the effects of VRT and/or DTT on balance, gait and risk of falls among sub-acute and chronic stroke survivors.

- **Literature search**: Medline, EMBASE, Web of Science, PubMed and Scopus for English databases were searched (June 2023 – August 2023)
- **Eligibility criteria**: Records were independently screened by 3 reviewers, against predefined eligibility criteria set using the PICO tool (Table 1)
- **Data extraction**: Eligible papers' data was extracted into a predesigned Microsoft excel sheet.
- **Performance of meta-analysis**: A random-effects model meta-analysis was completed using RevMan, to evaluate the efficacy of VRT and/or DTT on balance and gait outcomes.
- **Critical appraisal**: The GRADE (Grading of Recommendations, Assessment, Development, and Evaluation) approach was used for rating the certainty of evidence, including a risk of bias assessment.
- **Study reporting**: The study was reported using the PRISMA guidelines.

PICO

Population	Sub-acute and chronic stroke survivors, >18 years of age, community-dwelling, independent ambulation.
Intervention	VRT and/or balance exercises with or without DTT.
Comparison	Usual care or conventional physiotherapy or sham intervention.
Outcome	Objective balance and/or gait outcome measures.



Results

Mean age: 60.9 years
Male: 62.11%
Mean time since stroke: 36 months

Measure of static balance: Berg Balance Scale (BBS)
Measure of dynamic balance/gait: TUG and/or cadence

VRT effects on balance and gait

VRT probably improves static balance and gait with a large effect (SMD = 0.71 95%CI [0.36, 1.05], p <0.00001), and moderate certainty of evidence (I2=62%, p=0.002).

Balance specific training showed the strongest effect followed by gait-specific training. Strength specific training crossed the line of no effect.

DTT effects on gait

DTT may improve gait, with a moderate effect size (SMD=0.46, 95% CI [0.18, 0.74], p=0.001), with low certainty of evidence (I^2=37%, p<0.20)

DTT, compared to STT demonstrated a significantly larger effect on gait performance, as per TUG outcomes.

Motor DTT training showed minimal difference compared to cognitive DTT on cadence.

Conclusions

VRT programmes aimed at improving balance and gait among sub-acute and chronic stroke survivors should focus on balance and gait-specific training with DTT.

Intervention duration and frequency findings were inconclusive.

Further high-quality randomised controlled trials of larger sample size are needed to develop a more robust VRT protocol for improving balance and gait among sub-acute and chronic adult stroke survivors.

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