Critically Appraised Topic for Primary Care Placement

CAT: Are lower limb strengthening exercises more effective than core strengthening exercises at improving balance in the elderly

Population: Elderly (Aged 65+)

Intervention: Lower limb strengthening exercises

Comparative: Core strengthening exercises

Outcome: Balance

Databases - Search: Approx. 20
Medline, Cochrane Library, CINAHL Plus, Google Scholar – Balance, Elderly, Fall*, Core strength*, Lower limb strength*, Quad* strength*, Tai Chi

Author; reference	Level of Evidence	Patient group/ Data collection	Primary and Secondary Outcomes	Key Findings	Limitations/ Bias
Latham et al., 2004 Systematic review of progressive strength training in older adults	Systematic Review	62 clinical trials comparing Progressive Resistance Training (PRT) with a control group Mean age >/=60 years	Primary: Barthel Index HRQOL Physical function domain of SF-36 Secondary: Physical impairment (i.e., strength and aerobic capacity) Functional limitations (i.e., balance, chair-rise, gait speed, timed up-and-go)	Most of the trials included in this review used machines for strength training and found no clear effect of strength training on standing balance. Improvement in some aspects of function such as gait speed, however the quality of trials has been of a poor standard overall. In those with significant results and adequate methodology, lower limb resistance training has improved functional balance.	Weight machines tend to strengthen a muscle in isolation; therefore often do not require the co-contraction of other muscles or postural stability to maintain balance during an exercise. So an improvement in balance could not be expected.

Cho et al., 2012 Effect of Lower Limb Strength on Falls and Balance of the Elderly	Clinical Trial	86 participants; Fallers (31), Non-fallers (55). Mean age 70.	"Chair Stand Test" (CST) for lower limb strength "Stability Index" (SI) for balance Health Status Questionnaire	CST significantly less in "Fallers" SI significantly greater in "Fallers" -> Greater postural sway and decreased balance Moderate negative correlation between CST and SI, meaning reduced LL strength can result to increase risk of falls in the elderly	Could not randomise study. Limited number of outcome measures. No criteria for patients, I.e. patient could have dementia which could affect results.
Wu, G., 2002 Evaluation of the Effectiveness of Tai Chi for Improving Balance and Preventing Falls in the Older Population—A Review	A Review	24 articles: 5 reviews; 2 prestudy reports (no results); 1 meta-analysis; 1 single-case study report; 15 trials.	Balance related outcome measures including: SLS; Rise from chair; MOS SF-36; Reach test; SOT; Tandem walking etc.	Duration of Tai chi to make a significant improvement in balance: approx. 40 sessions. In comparison to other interventions, tai chi showed significant decrease in the risk of falls. Overall, outcomes of studies were inconsistent. Duration of tai chi was variable. High quality trials required on patients with balance impairments	Limited number of studies. No standardised tai chi form throughout all the studies. There were over 15 different balance related measures throughout studies. Some studies included a mix of population.
Halvarsson et al., 2012 Long-term effects of new progressive group balance training for elderly people with increased risk of falling – a randomized controlled trial	Randomised Controlled Trial	59 participants; Training group (38); Control group (21). 42 females, 17 males	Gait function (preferred and fast speed), Rapid step execution (single and dual task), Fear of falling, Likelihood of depression Measured at baseline, 3 months, 9 months and 15 months. 11 drop outs by the 15 month follow up.	Fast gait, dual step execution and fear of falling significantly improved at 9/12 Positive short term and long term benefits with specific programme to gait, balance and fear of falling.	Female dominated study. Control group not specified.

Bottom Line and Clinical Relevance

There is limited literature currently available looking at core strength and balance, however some papers have looked at functional movements and improving balance. Tai chi is an option to improve functional balance in the elderly population; however it is difficult to incorporate into the community setting. Lower limb strengthening exercises have been shown clinically and through literature that it does improve balance and reduce risk of falls in the elderly. A combination of lower limb and core strengthening exercises could be of greater benefit, however more research is required.

References

Cho, K. H., Bok, S. K., Kim, Y., Hwang, S. L., 2012. Effect of Lower Limb Strength on Falls and Balance of the Elderly. *Annals of Rehabilitation Medicine,* 36:pp.386-393.

Halvarsson, A., Franzén, E., Farén, E., Olsson, E., Oddsson, L., Ståhle, A., 2012. Long-term effects of new progressive group balance training for elderly people with increased risk of falling – a randomized controlled trial. *Sage Journals,* 27(5):pp.450-458.

Latham , N. K., Bennett, D. A., Stretton, C. M., Anderson, C. S., 2004. Systematic review of progressive strength training in older adults. *The Journals of Gerontology*, 59(1):pp.48-61.

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