

Is specific fall prevention training more effective at reducing fall risk, compared to generalised training programmes in seniors aged 65-80 years?



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Background

- The New Zealand population is aging dramatically, with the number of individuals aged 65+ predicted to increase by 215,000 between 2011-2021 (1).
- 30% of the elderly New Zealand population experience a fall every year; this is detrimental to the well-being of the individuals, but also directly increases government expenditure through funding the healthcare associated with elderly falls (1).
- In 2016, ACC claims for falls in people aged 65+, was a total of \$170,430,224. This will only increase if more effective preventative strategies are not implemented.

Purpose

- This study aims to establish whether specific fall prevention exercises are more effective at reducing fall risk, compared to generalised training programmes.

Methods

- Seven volunteers (4 male; 3 female), already members of the WINTEC Biokinetic Clinic, were involved in this 6-week pilot study.
- Participants were randomly assigned to 2 groups; control group (A)=4 participants (3 M; 1 F) and intervention group (B)=3 participants (1 M; 2 F).
- Group A:** Continued with their usual generalised training at the biokinetic clinic. No change in routines.
- Group B:** Completed their prescribed programme 3 times per week, whilst continuing with their usual training at the biokinetic clinic.
- Progressions were made during 1-on-1 sessions every 2 weeks (refer to Intervention Programme for an outline of progressions)

- All participants were tested before and after the 6-week intervention to establish improvements, using the assessments explained below:

4-Stance Balance Assessment

Parallel Stance: Feet together, hold for 10 seconds

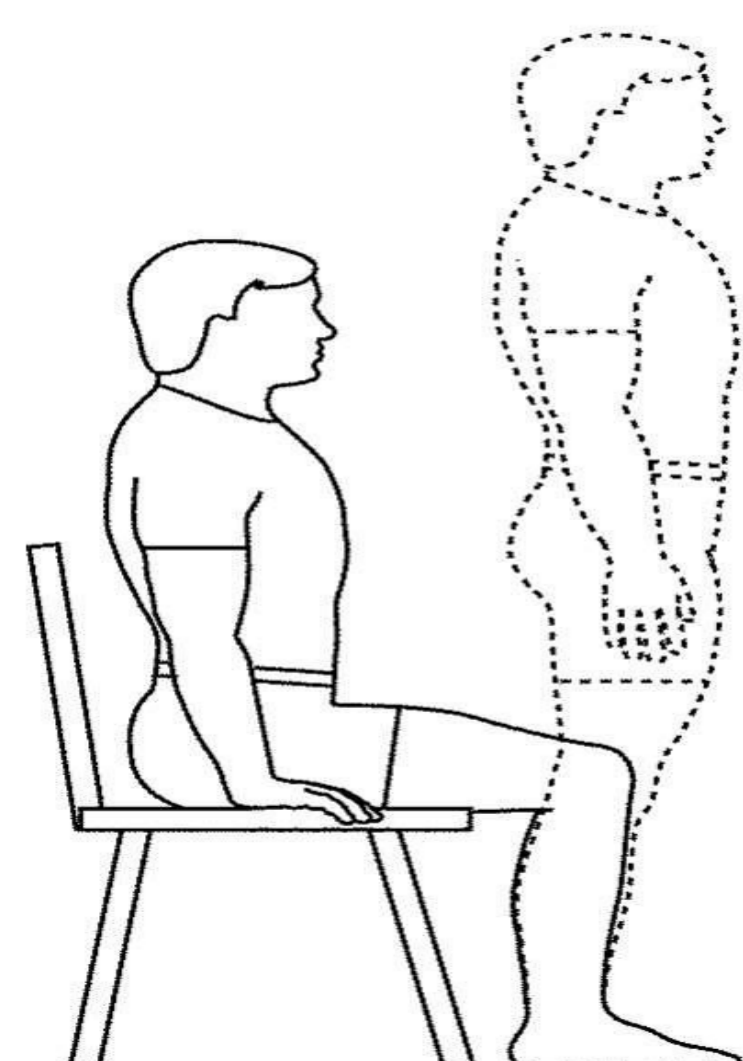
Semi-tandem Stance: Big toe against instep of opposite foot. Hold for 10 seconds. Repeat on opposite side.

Tandem Stance: Middle toe against heel of opposite foot. Hold for 10 seconds. Repeat on opposite side.

Single-leg Stance: Standing on one leg only. Hold for 10 seconds. Repeat on opposite side.

Participants were given a demonstration, but time was recorded on first attempt, to ensure the assessment was an accurate representation of balance ability. Each stance time was recorded, and failure to reach 10 seconds in any given stance, meant they did not progress to the next stance (2).

Sit-to-Stand Lower Limb Strength Assessment



Participants were given a demonstration of the exercise.

Participants were provided 1 opportunity to complete as many sit-to-stance repetitions as possible in 30 seconds (3).

Intervention Programme

EXERCISES	Week 1 & 2		
	LEVEL 1 (support used)	LEVEL 2 (minimal support used)	LEVEL 3 (No support used)
Walking (on the spot)	1 minute 2 sets 1 minute rest	2 minutes 1 set	2 minutes 1 set Arms moving
Calf Raise	10 reps 2 sets Double-leg stance	10 reps 2 sets Double-leg stance	10 reps each side 1 set Single-leg stance
Sit-to-stand	10 reps 2 sets	10 reps 2 sets	10 reps 2 sets
Balance	Semi-tandem stance 30 seconds each side 1 set	Tandem stance Eyes closed 30 seconds each side 1 set	Single-leg stance 30 seconds each side 1 set

EXERCISES	Week 3 & 4		
	LEVEL 1 (Minimal Support used)	LEVEL 2 (Minimal-no support used)	LEVEL 3 (No support used)
Walking (on the spot)	2 minutes 1 set	2 minutes 1 set Arms moving slow	2 minutes 1 set Arms moving fast
Dorsi-flexion	10 reps 2 sets Seated	10 reps 2 sets Standing	10 reps 2 sets Standing
Leg extension	5 reps each side 2 sets	10 reps each side 2 sets	10 reps 2 sets 2:1:2 tempo
Sit-to-stand	10 reps 2 sets	10 reps 2 sets	15 reps 2 sets
Balance	Semi-tandem stance 30 seconds each side 1 set	Tandem stance Eyes closed 30 seconds each side 1 set	Single-leg stance 30 seconds each side 1 set

EXERCISES	Week 5 & 6		
	LEVEL 1 (Minimal-no support used)	LEVEL 2 (No support used)	LEVEL 3 (No support used)
Walking (on the spot)	2 minutes 1 set	2 minutes 1 set Arms moving fast	2 minutes 1 set Semi-circle motion with arms
Figure of 8 (walking)	5 reps 2 sets	5 reps 2 sets	5 reps 2 sets Heel-toe walking
Knee Bends	10 reps 2 sets	10 reps 2 sets	10 reps 2 sets
Sit-to-stand	10 reps 2 sets	15 reps 2 sets	10 reps 2 sets Feet on pillow
Balance	Tandem Stance 30 seconds each side 2 sets	Single-leg Stance Support if needed 30 seconds each side 1 set	Tandem walk 5 reps each side 2 sets

Control Group Summary

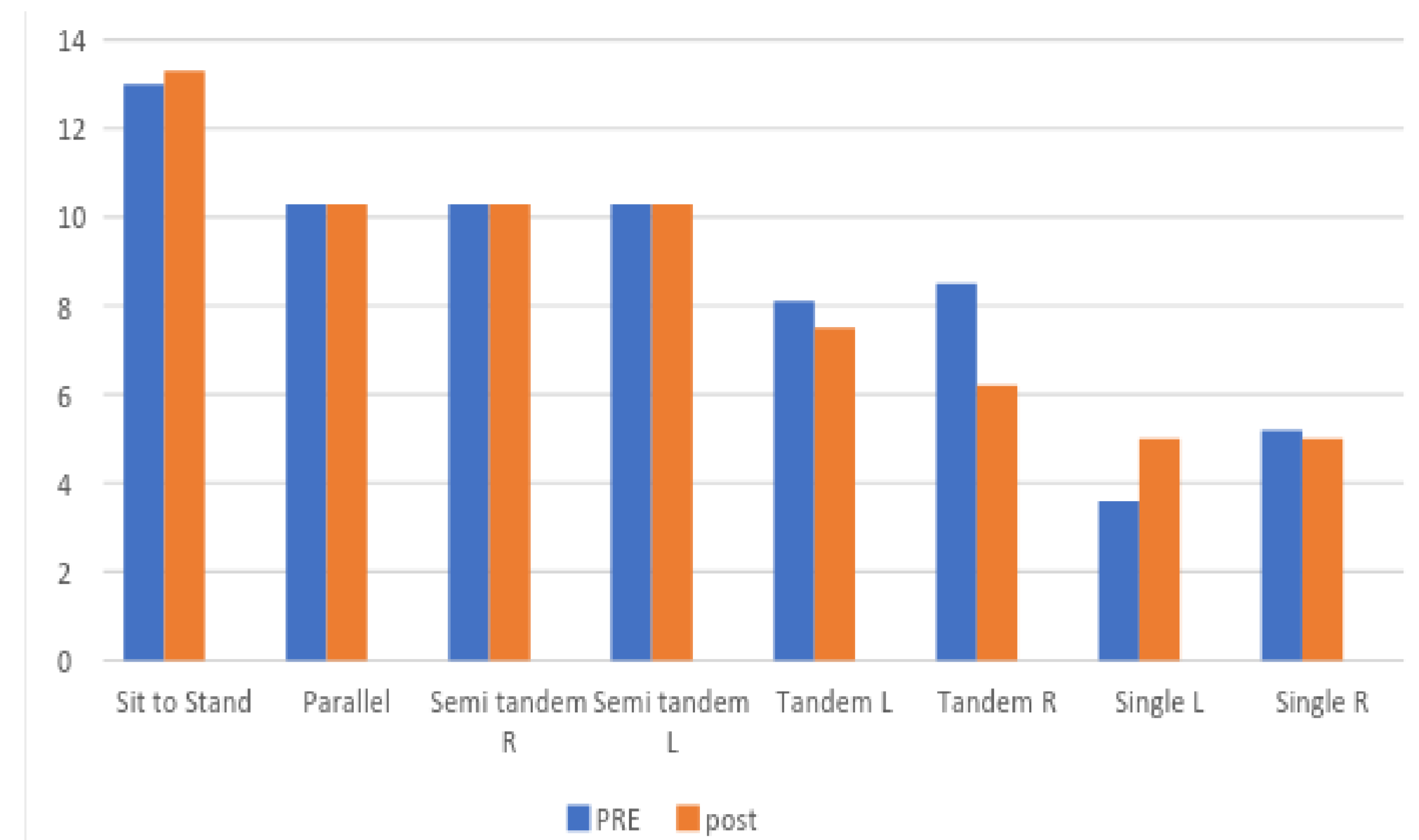


Fig. 1 Pre/post test results for the control group

Intervention Group Summary

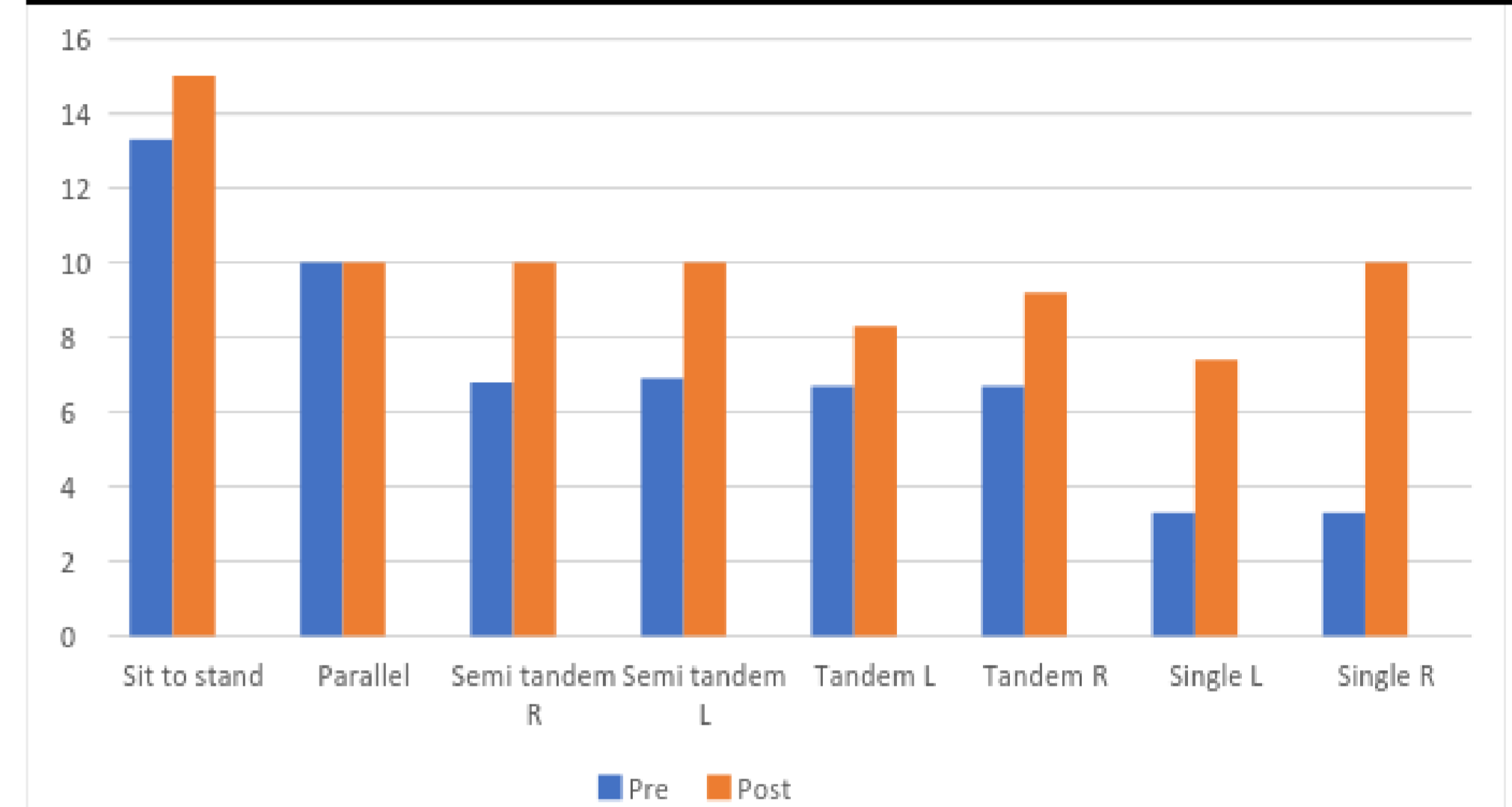


Fig. 2 Pre/post test results for the intervention group

Overall Findings

- Sit-to-stand results improved slightly after training for the intervention group, however, this improvement was insignificant ($p > 0.05$) when compared against the control group.
- The intervention group made apparent improvements in all balance tests, when compared against the control group. Most significant improvements were seen for:
 - Single-leg stance right and left had overall improvements of 207% and 203% respectively.
 - Tandem stance right and left had overall improvements of 64% and 24% respectively.

Conclusions

The improvements observed in all pre/post assessments were not significant for either group. Therefore, no reliable conclusions can be made, regarding what type of training is most effective at reducing fall risk. However, the intervention group did improve more than the control; especially in the balance assessment. Further research is required to establish whether this increase was sufficient.

Recommendations

Further research should be undertaken, to support the use of this new training programme. Steps needed to improve future research include:

- Larger sample size: to ensure the findings are transferable to the wider population.
- Improve balance assessment: using strong statistical based assessments, such as the Berg Balance Scale, to improve accuracy of individual balance measures.
- Increase study duration: having an intervention period of ideally 12 weeks or more, to accurately monitor improvements.

Practical Application

The findings from this study are applicable to any health care professionals, dealing with elderly. Organisations such as ACC, or other health care providers; can use this information to implement more effective fall prevention programmes.

References

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