

Effects of physical activity on fall risk factors in adults aged 40-65

Report to Queensland Health Department

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THE GEORGE INSTITUTE
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Executive summary

Aims

This project aimed to develop evidence-based recommendations for physical activity among adults aged 40-65 after systematically reviewing the scientific literature.

The systematic review sought to answer the following questions:

1. What is the effect of physical activity programs on strength and balance in adults aged 40-65?
2. What is the documented and possible effect of physical activity programs on risk of falling in adults aged 40-65?

Methods

A systematic review of randomised controlled trials was conducted. Outcome measures in the included trials were classified as being primarily measures of strength, balance or endurance. Reduced balance and strength are strong risk factors for falls in older adults. As many of the studies also measured endurance this outcome, data for this outcome were also extracted. Separate meta-analyses were conducted for each of these outcomes.

Results

Twenty-two eligible randomised controlled trials were identified. Data from 17 of the included studies were able to be pooled in the meta-analyses.

The meta-analysis of strength outcomes included 13 studies (17 comparisons as four studies had more than one group) and found a moderate effect of exercise on strength (standardised difference in means 0.51, 95% CI 0.35 to 0.68, $p < 0.001$, random effects meta-analysis, $I^2 = 15\%$). There were bigger effects from the programs which specifically targeted strength using resistance exercise. The pooled effect from the 7 programs that did not use resistance exercise was 0.32 (0.04 to 0.60) whereas the pooled effect from the 10 programs that used resistance exercise was 0.66 (95% CI 0.42 to 0.90). This difference was close to being statistically significant (effect of strength in meta-regression, $p = 0.066$).

The meta-analysis of balance outcomes included six studies and found a moderate effect of exercise on balance (standardised difference in means 0.43, 95% CI 0.25 to 0.60, $p < 0.001$, random effects meta-analysis, $I^2 = 0\%$).

The meta-analysis of endurance outcomes included six studies (eight comparisons as one study had three groups) and found a large effect of exercise on endurance (standardised difference in means 0.85, 95% CI 0.61 to 1.09, $p < 0.001$, random effects meta-analysis, $I^2 = 75\%$).

No studies reported effects of physical activity on falls.

Conclusions

1. It is known that strength and balance deteriorate after the age of 40.
2. This review found that muscle strength, balance and endurance can clearly be improved by physical activity in people aged 40-65.

3. There were bigger effects on muscle strength from programs which specifically targeted strength using resistance exercises along the lines of the American College of Sports Medicine recommendations (i.e. using a weight so heavy it can only be lifted 10-15 times before resting).
4. There were insufficient studies in this review to enable investigation of different forms of exercise on balance and endurance.
5. Studies have not documented an effect of physical activity in people aged 40-65 on short- or longer-term falls. These studies are unlikely to be undertaken given the lower incidence of falls in people aged 40-65 and the long follow-up periods required to assess the effect of intervention on falls later in life.
6. Given the importance of strength and balance as risk factors for falls in older people, it is likely that future falls would be prevented by adoption and maintenance of exercise programs by people aged 40-65. Such programs should include strength and balance components.

Recommendations

1. It is recommended that Queensland Health encourage adoption and maintenance of physical activity among people aged 40-65.
2. To be most likely to prevent future falls these physical activity programs should include both balance and strength training components.
3. Exercises should target muscle strength specifically by providing weights or other forms of resistance and aiming for an intensity and dose of strength training suggested by the American College of Sports Medicine guidelines for adults under 65 of age (i.e. 8-10 strength-training exercises, 8-12 repetitions of each exercise twice a week at an intensity where only 8-10 repetitions can be done without resting).
4. As previous work has pointed to the importance of “specificity” in balance training i.e. people get better at what they practice, balance should also be targeted with exercises which involve challenges to balance such as tennis, dancing, tai chi, exercise to music and running.
5. The American College of Sports Medicine recommendations for people aged 65 years and over suggest a combination of general physical activity, endurance training, strength training and balance training. It is suggested that these guidelines be used to inform exercise programs for adults aged 40-65 in Queensland in addition to the Australian Government recommendations which focus on overall physical activity levels.
6. Further research is needed to understand exercise adherence in this population and to establish optimal approaches to widespread program delivery.