Effect of exercise on physical function, daily living activities, and quality of life in the frail older adults: a meta-analysis

Chou CH, Hwang CL, Wu YT

CRD summary
The review concluded that exercise interventions have only slight effects on physical function in frail older adults. No recommendation was made as to which type of exercise was most effective. The authors' conclusion reflected the evidence presented. However, given the potential for bias in the review process and the variation between studies, their conclusions should be interpreted with caution.

Authors' objectives
To evaluate the effect of exercise on the physical function, activities of daily living and quality of life of frail older adults.

Searching
PubMed, EMBASE, Chinese Electronic Periodical Service, CINAHL and the Cochrane Central Register of Controlled Trials (CENTRAL) were searched for articles published between 2001 and June 2010. Search terms were reported. The search was restricted to studies published in English or Chinese.

Study selection
Randomised controlled trials (RCTs) were included if participants were recruited based on established frailty criteria, including reduced strength, poor endurance and low physical activity level. In order to be included trials also had to compare a single- or multiple-component exercise programme to usual care with no intervention or with sham or light-intensity exercise. Studies were included if they assessed physical function and quality of life outcomes using established measures.

Participant age ranged from 75.3 to 86.8 years. Where reported, the proportion of male participants ranged from zero to 49%. In five studies the exercise regimen included a focus on activities of daily living and functional exercises. One study used Tai Chi, another resistance exercise. In one study a multi-phasic regimen was used, including a range of activities focused on physical fitness. Three trials used usual care as the comparator treatment, two used placebo exercise and another two controlled exercise. One study used a no-exercise comparator. Where reported, treatment duration ranged from ten to 48 weeks.

Two reviewers assessed study eligibility based on titles and abstracts. It appeared that two reviewers were also involved in the selection of studies from full papers. Disagreements were discussed with a third reviewer.

Assessment of study quality
Two reviewers assessed the quality of the included studies using the Physiotherapy Evidence Database scale. Scores on the scale ranged between zero and ten with higher scores indicating higher study quality. Authors excluded trials scoring below four.

Data extraction
Data were extracted to calculate mean differences and corresponding 95% confidence intervals (CIs) for physical function, activities of daily living and quality of life outcomes. Study authors were contacted to request missing information. It appeared that two authors extracted the data.

Methods of synthesis
Data were combined to calculate weighted mean differences (WMD) using a fixed-effect model where there was no evidence of heterogeneity, otherwise a random-effects model was used. Heterogeneity was assessed using the $X^2$ test and $I^2$ statistic.

Results of the review
Eight RCTs were included in the review (1,068 participants). Sample sizes ranged from 30 to 311. Physiotherapy Evidence Database scale scores ranged from four to eight with the risk of bias being the greatest in the domains of allocation concealment and blinding. Half the studies did not conceal allocation. None of the studies blinded participants or therapists and only half of them blinded outcome assessors.

**Physical function:** The exercise group showed a significant increase in gait speed (WMD 0.07 m/s, 95% CI 0.02 to 0.11, four trials) and a significant improvement in Berg Balance Scale scores (WMD 1.7 points, 95% CI 0.6 to 2.8, four trials) compared to the control group. There was evidence of statistical heterogeneity for the gait speed analysis ($I^2=60\%$). There was no significant difference between groups in time taken to get up and go (three trials). There was evidence of significant heterogeneity ($I^2=96\%$) in this analysis.

**Activities of daily living:** The exercise group showed a significantly better performance in activities of daily living score than the control group (WMD 5.33, 95% CI 1.01 to 9.64, three trials). There was evidence of significant statistical heterogeneity for this analysis ($I^2=77\%$).

**Quality of life:** There were no significant differences between groups regarding both mental (two trials) and physical (three trials) quality of life. No information on heterogeneity was presented for this analysis.

**Authors' conclusions**
Exercise interventions have only slight effects on physical function in frail older adults. The samples used in the included studies may not have been representative of the population so no recommendation was made as to which type of exercise was most effective.

**CRD commentary**
The review question and inclusion criteria were clear. Several relevant sources were searched, but there was a potential for language bias. Only published studies were included so there was a risk of publication bias. Independent, duplicate processes appeared to have been in place for study selection, data extraction and quality assessment, which reduced the risk of reviewer error and bias in these areas.

The method of data synthesis was appropriate. There was evidence of statistical heterogeneity in some analyses but this was not explored further. Details of the quality assessment were reported. Individual study quality did not seem to have been taken into account in the analyses which made it difficult to interpret the results. The authors highlighted that the samples used in the included studies may not be representative of the population of frail older adults due to age and/or comorbidity-based exclusion criteria in individual studies. It was also stated that no recommendations were being made as to which type of exercise intervention might be most effective in practice.

The authors’ careful conclusion reflected the evidence presented. However, given the potential for bias in the review process and the variation between studies, their conclusions should be interpreted with caution.

**Implications of the review for practice and research**
**Practice:** The authors did not state implications for practice.

**Research:** The authors recommend further work should aim to include a wider range of participants in order to avoid sampling biases. Also, they state a need for large-scale, high quality RCTs in the area.

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