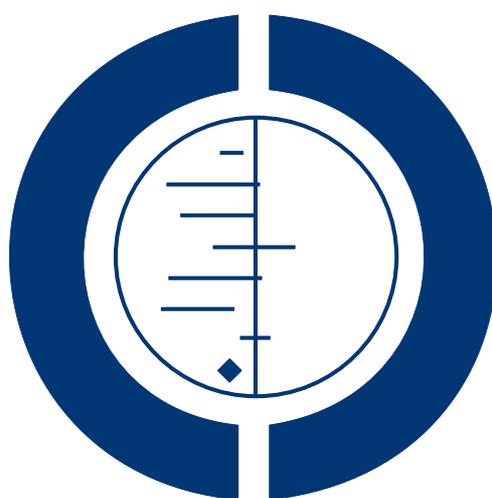


Exercise training for adults with chronic kidney disease (Review)

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[Intervention Review]

Exercise training for adults with chronic kidney disease

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ABSTRACT

Background

Chronic kidney disease (CKD) is a worldwide public health problem. In the National Kidney Foundation Disease Outcomes Quality Initiative guidelines it is stressed that lifestyle issues such as physical activity should be seen as cornerstones of the therapy. The physical fitness in adults with CKD is so reduced that it impinges on ability and capacity to perform activities in everyday life and occupational tasks. An increasing number of studies have been published regarding health effects of various regular exercise programmes in adults with CKD and in renal transplant patients.

Objectives

We aimed to: 1) assess the effects of regular exercise in adults with CKD and kidney transplant patients; and 2) determine how the exercise programme should be designed (e.g. type, duration, intensity, frequency of exercise) to be able to affect physical fitness and functioning, level of physical activity, cardiovascular dimensions, nutrition, lipids, glucose metabolism, systemic inflammation, muscle morphology and morphometrics, dropout rates, compliance, adverse events and mortality.

Search strategy

We searched the Cochrane Renal Group's specialised register, CENTRAL, MEDLINE, EMBASE, CINAHL, Web of Science, Biosis, Pedro, Amed, AgeLine, PsycINFO and KoreaMed. We also handsearched reference lists of review articles and included studies, conference proceeding's abstracts. There were no language restrictions.

Date of last search: May 2010.

Selection criteria

We included any randomised controlled trial (RCT) enrolling adults with CKD or kidney transplant recipients undergoing any type of physical exercise intervention undertaken for eight weeks or more. Studies using less than eight weeks exercise, those only recommending an increase in physical activity, and studies in which co-interventions are not applied or given to both groups were excluded.

Data collection and analysis

Data extraction and assessment of study and data quality were performed independently by the two authors. Continuous outcome data are presented as standardised mean difference (SMD) or mean difference (MD) with 95% confidence intervals (CI).

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Main results

Forty-five studies, randomising 1863 participants were included in this review. Thirty two studies presented data that could be meta-analysed. Types of exercise training included cardiovascular training, mixed cardiovascular and resistance training, resistance-only training and yoga. Some studies used supervised exercise interventions and others used unsupervised interventions. Exercise intensity was classed as 'high' or 'low', duration of individual exercise sessions ranged from 20 minutes/session to 110 minutes/session, and study duration was from two to 18 months. Seventeen per cent of studies were classed as having an overall low risk of bias, 33% as moderate, and 49% as having a high risk of bias.

The results shows that regular exercise significantly improved: 1) physical fitness (aerobic capacity, 24 studies, 847 participants: SMD -0.56, 95% CI -0.70 to -0.42; walking capacity, 7 studies, 191 participants: SMD -0.36, 95% CI -0.65 to -0.06); 2) cardiovascular dimensions (resting diastolic blood pressure, 11 studies, 419 participants: MD 2.32 mm Hg, 95% CI 0.59 to 4.05; resting systolic blood pressure, 9 studies, 347 participants: MD 6.08 mm Hg, 95% CI 2.15 to 10.12; heart rate, 11 studies, 229 participants: MD 6 bpm, 95% CI 10 to 2); 3) some nutritional parameters (albumin, 3 studies, 111 participants: MD -2.28 g/L, 95% CI -4.25 to -0.32; pre-albumin, 3 studies, 111 participants: MD -44.02 mg/L, 95% CI -71.52 to -16.53; energy intake, 4 studies, 97 participants: SMD -0.47, 95% CI -0.88 to -0.05); and 4) health-related quality of life. Results also showed how exercise should be designed in order to optimise the effect. Other outcomes had insufficient evidence.

Authors' conclusions

There is evidence for significant beneficial effects of regular exercise on physical fitness, walking capacity, cardiovascular dimensions (e.g. blood pressure and heart rate), health-related quality of life and some nutritional parameters in adults with CKD. Other outcomes had insufficient evidence due to the lack of data from RCTs. The design of the exercise intervention causes difference in effect size and should be considered when prescribing exercise with the aim of affecting a certain outcome. Future RCTs should focus more on the effects of resistance training interventions or mixed cardiovascular- and resistance training as these exercise types have not been studied as much as cardiovascular exercise.

PLAIN LANGUAGE SUMMARY

Exercise training for adults with chronic kidney disease

Exercise regimens are based on the frequency, intensity and duration of exercise training as well as the type of activity and the individual's initial level of physical fitness. All these factors have to be taken into account when aiming to achieve the goal with the regular exercise training and or rehabilitation.

Forty-five studies, randomising 1863 participants were included in this review. Thirty two studies presented data that could be included in the meta-analyses. This review showed that regular exercise training significantly improved physical fitness, physical functioning (e.g. walking capacity), and health-related quality of life in adults with chronic kidney disease (CKD). Beneficial effects were also seen on other outcome measures, such as blood pressure, but where the level of evidence is somewhat lower due to too few research studies and or small study populations. Beneficial effects were present in both adults with CKD but not yet in need of dialysis treatment, patients with dialysis (haemodialysis and peritoneal dialysis) and kidney transplant recipients.

This systematic review and meta-analysis presents evidence-based data to clinicians and patients on which type of exercise regimen (type of exercises, intensity, frequency and duration of exercise) that should be used to optimise the effect size. The results should be implemented by clinicians who should encourage and inform adults with CKD that there is scientific evidence for beneficial effects of regular exercise training, and who should use an adequate exercise intervention in order to achieve the patient's and the clinician's goal with the regular exercise.