Systematic review of the effect of diet and exercise lifestyle interventions in the secondary prevention of coronary heart disease

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CRD summary
This review concluded that lifestyle interventions had beneficial effects for patients with coronary heart disease. This conclusion is likely to be reliable, but the relative effectiveness of intervention components and generalisability to high-risk populations remain unclear. The evidence for beneficial effects was restricted to reductions in all-cause and cardiac mortality and cardiac non-fatal events.

Authors' objectives
To determine the effectiveness of lifestyle interventions for the secondary prevention of coronary heart disease.

Searching
MEDLINE, EMBASE and CINAHL databases were searched for English-language randomised trials in humans published since 1990. The search strategies were reported and the reference lists of review articles were searched.

Study selection
Randomised controlled trials of adults with a diagnosis of coronary heart disease, including after myocardial infarction, coronary artery bypass graft, percutaneous transluminal coronary angioplasty, or with angina pectoris and coronary artery disease, defined by angiography, were eligible for inclusion. Relevant interventions were defined as diet, exercise, psychological, educational, multifactorial or organisational, such as case management, with a comparator of normal or usual care. The primary outcomes were mortality, cardiac mortality, nonfatal cardiac events and hospital admissions (cardiac and any cause). Eight additional secondary outcomes including physical activity and adherence to medication were reported. Trials had to have a minimum postintervention follow-up of three months. Trials of patients with multiple diseases, of primary prevention, or in hospital in-patient settings were excluded.

Trials varied considerably in all domains. Patient conditions and ages varied by trial (details reported); most patients were male and at low risk. Most interventions were multifactorial, with a comparator of standard clinical or general practitioner care; a range of single-mode interventions was reported. Duration ranged from three months to five years. Setting, intervention intensity and professional input all varied.

Two reviewers independently assessed reports for inclusion.

Assessment of study quality
The quality of trials was assessed for randomisation method, loss to follow-up, intention-to-treat analysis and blinding measures.

It was not clear if two reviewers independently assessed quality or not.

Data extraction
Dichotomous outcomes were expressed as relative risks with 95% confidence intervals. Continuous variables were expressed as mean differences with standard deviations.

It was not clear how missing data were sought or if two reviewers independently extracted data or not.

Methods of synthesis
The effects were pooled using Mantel-Haenszel random effects models. Heterogeneity between trials was assessed using $I^2$ and $\chi^2$. Different interventions were combined in the same analysis, thus lifestyle interventions were treated as being exchangeable. The reasons for any heterogeneity were not explored. Secondary outcomes were synthesised using vote counting (summing the number of trials with statistically significant or non-significant effects).
Results of the review

Twenty-one randomised trials were included in the review; sample sizes ranged from 48 to 3,241. Follow-up ranged from three months to 15 years. Seven trials did not describe randomisation methods and three used some form of block randomisation. Thirteen trials stated that analysis was based on intention to treat and seven reported that outcome assessors were blind to group allocation.

Lifestyle interventions reduced all-cause mortality (RR 0.75, 95% CI 0.65 to 0.87; six trials; 7,053 patients; I²=0); cardiovascular mortality (RR 0.63, 95% CI 0.47 to 0.84; eight trials; 7,188 patients; I²=39%); and nonfatal cardiac events (RR 0.68, 95% CI 0.55 to 0.84; nine trials; 16 separate events; 13,349 patients; I²=58%). The data on hospital admissions were available from five trials with an overall trend towards reduced admissions with the interventions, but these data were not pooled using meta-analysis.

Twenty-one trials analysed the effectiveness of physical activity and 20 reported significant improvements for intervention patients compared with controls. Nine trials reported the use of medications and six reported significant improvements for intervention patients compared with controls.

Authorsʼ conclusions

Lifestyle interventions promoting regular physical activity, a healthy diet and adherence to medication had beneficial effects for patients with coronary heart disease, but firm conclusions were difficult due to the poor quality of the evidence.

CRD commentary

This review addressed a clearly defined question, but the different lifestyle interventions might not have been comparable and there was no assessment of the intervention components. The rigorous search and the inclusion criteria will allow the replication of the data selection and minimised potential selection bias, but better attempts to identify grey literature could have minimised publication bias. The quality assessment was appropriate, but it was unclear if this was duplicated by independent reviewers.

Meta-analysis of three of the four primary outcomes was appropriate; it was unclear why hospital admission was not also synthesised. Secondary outcomes, important for the implications for practice, were synthesised by vote counting, which introduced bias as there was no consideration of the size of the effect or the quality of the trial. The generalisability of the findings is restricted to low-risk men, despite the variation in other components of the question. The quality of the included trials was variable, introducing some uncertainty in the findings, as acknowledged by the authors.

The conclusion that lifestyle interventions had beneficial effects reflected the evidence and is likely to be reliable, but the relative effectiveness of the interventions in different settings remains unknown. The authors explicitly acknowledged this issue and suggested further research. The conclusions for hospital admissions, physical activity and adherence to medication were not based on meta-analysis and may be biased and unreliable.

Implications of the review for practice and research

Practice: The authors stated that practitioners should advocate a healthy lifestyle for patients with coronary heart disease.

Research: Future research should focus on the components of interventions, and the ideal combination of measures, intervention intensity and duration. The quality of future trials should be improved and barriers to changes in lifestyle should be investigated.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.