Exercise and cancer rehabilitation: a systematic review
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CRD summary
The review found that exercise programs in cancer survivors during the rehabilitation period were feasible and may provide physiological and psychological benefits. Due to heterogeneity among participants, exercise programs, outcomes and follow-up periods, substantial methodological flaws in the included studies and potential bias in the review process, the authors conclusions should be considered to be very tentative.

Authors' objectives
To assess the effectiveness of exercise programmes on health-related outcomes in cancer survivors in the rehabilitation period.

Searching
PUBMED and EMBASE were searched for relevant studies published in English up to April 2009; minimal search terms were reported. Reference lists of retrieved articles and relevant reviews were searched.

Study selection
Eligible studies were single group pre-test post-test studies, controlled clinical trials or randomised controlled trials (RCTs). Eligible participants were cancer patients who had recently completed adjuvant chemotherapy and/or radiotherapy for any cancer and who had reported no plans for additional treatment (except hormone treatment for breast cancer). Recently completed was generally defined as 12 months or less between enrolment and treatment. Eligible interventions were aerobic and/or resistance training programmes with or without range of motion or flexibility exercises. Eligible outcomes were all possible health-related effects of cancer and subsequent treatments apparent in the rehabilitation period and included disease and treatment-related symptoms, quality of life, fatigue, body composition, physical function/fitness and exercise behaviour.

Studies were excluded if they included only range of motion or flexibility exercises, if the intervention was a multi-strategy programme, if the intervention was a single bout of exercise and if the programme was used to relieve or control lymphoedema.

In the included studies, participants were survivors of various cancers; most survivors had a breast cancer diagnosis. Participant age ranged from 16 to 71 years. Men and women were included. Most interventions were supervised exercise programmes. Two tailored programmes were unsupervised and these included either aerobic exercise alone or aerobic and resistance exercises. The intervention period ranged from two weeks to six months. Frequency ranged from daily to a minimum of two sessions per week. Methods to measure intensity varied. Intensity ranged from light to high. Duration of the exercise sessions ranged from 30 minutes to 90 minutes. Control groups, where reported, either maintained current levels of physical activity, were offered the intervention after the study ended or took part in a stretching programme that resulted in equivalent trainer time to that of the intervention group. Outcomes included physical function, fatigue, quality of life, haematological and immunological measures and body composition.

One reviewer selected studies for the review in consultation with a second reviewer over eligibility. There was additional input from a third reviewer.

Assessment of study quality
Criteria for quality assessment included randomisation method, allocation concealment, blinding and use of intention to treat analysis.

The authors did not state how many reviewers assessed study quality.

Data extraction
Data were extracted on adherence to the programme and its effects on health outcomes, according to how these were reported in the individual studies.

The authors did not state how data were extracted.

**Methods of synthesis**
Study results were synthesized in narrative format and reported in tables.

**Results of the review**
Ten studies (13 publications, n=483 participants) were included in the review. Four trials were RCTs with no exercise control groups. Three trials were controlled nonrandomised. Two trials were randomised trials that compared different exercise intensities. One study had a single group design (before-after study). None of the studies met all four quality criteria. Three studies met three quality criteria. Three studies met one quality criterion. Four studies met none of the quality criteria. Where reported, adherence to the exercise intervention was high (range 80% to 90%).

Six studies reported improvements in physical functioning and one reported loss of physical function. Two of three studies reported less fatigue in the intervention groups and one study reported enhanced quality of life as a result of aerobic and resistance training. Some haematological and immunological outcomes and potential markers of recurrence were improved in exercise groups. One of two studies found an increase in fat-free body mass associated with a decrease in percentage of body fat.

**Authors’ conclusions**
Methodological limitations made it difficult to draw firm conclusions, but exercise programmes were feasible and may provide physiological and psychological benefits for cancer survivors during the rehabilitation period.

**CRD commentary**
The review addressed a clear research question. Broad inclusion criteria appeared appropriate. Two electronic databases were searched for studies. Reference lists of retrieved studies were searched. As studies were eligible only if published in English, language bias could not be excluded. No attempts were made to find unpublished studies, so publication bias could not be ruled out. Appropriate methods were used to select relevant studies. Methods used for quality assessment and data extraction were not reported, so reviewer error and bias could not be ruled out. Quality assessment was undertaken using appropriate criteria and revealed substantial methodological flaws in the included studies. Wide variation in participants, interventions, control groups and outcomes in the included studies made the decision to synthesise results in narrative format appropriate. The authors acknowledged that bias was likely because many of the included studies had evidence of selective outcome reporting (reporting only outcomes with positive results) for their multiple outcomes.

Due to the heterogeneity of participants, exercise programs, outcomes and follow up periods, substantial methodological flaws of the included studies and potential bias in the review process, the authors’ conclusions should be considered to be very tentative.

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

Research: The authors stated that further studies with rigorous study designs were required to adequately answer the research question. They suggested that researchers develop a consistent time frame to define the rehabilitation period, evaluate the most relevant outcomes by appropriate standardised measures, undertake pilot studies to adequately assess the required sample sizes for research studies and use appropriate methodology to ensure studies are of sufficient quality.

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Record Status
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.