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Effect of exercise and androgen deprivation therapy on prostate cancer: a meta-analysis

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Abstract

Androgen deprivation therapy is a common treatment for prostate cancer. However, this therapy is associated with various adverse effects, such as increased body fat and decreased bone mineral density. Exercise may be useful for ameliorating these adverse effects, although it is not completely effective. This review aimed to clarify how exercise interventions influenced body composition and bone mineral density and to explore the most effective exercise program among prostate cancer patients who received androgen deprivation therapy.
We searched the PubMed, EMBASE, Web of Science, EBSCO, and Cochrane Library databases for reports of randomised controlled trials that were published until October 2021. All studies involved prostate cancer patients who received androgen deprivation therapy and completed aerobic exercise, resistance exercise, and/or impact exercise training. Outcomes were defined as lean body mass, body fat mass, body fat rate, regional and whole-body bone mineral density. Random effect models were used given the heterogeneity of interventions. Subgroup analyses were performed according to exercise type, exercise intensity, exercise duration, and ADT duration.

Guidelines

The protocol conformed to the Preferred Reporting Items for Systematic Reviews and Meta Analyses guidelines.

Troubleshooting

Preliminary searches

1 We searched the PubMed, EMBASE, Web of Science, EBSCO, and Cochrane Library databases for reports that were published until October 22, 2021. The search terms generally focused on ‘exercise’, ‘training’, ‘physical activity’, ‘prostate cancer’, and ‘androgen deprivation therapy’.

Formal screening of search results against eligibility criteria

2 The inclusion criteria were based on the PICOS framework.
(1) Population: all participants were adult men diagnosed with prostate cancer, and were currently receiving ADT during the intervention, regardless of whether they had received chemotherapy, radiotherapy or other therapy.
(2) Intervention: the interventions included aerobic exercise, resistance exercise, and/or impact exercise.
(3) Outcomes: the report should describe at least one relevant outcome (lean body mass, body fat mass, body fat rate, regional and whole-body bone mineral density).
(4) Study: reports of RCTs and studies were considered appropriate if they were published in English.

3 The exclusion criteria were:
(1) studies that did not provide ADT to all patients (unless the results were stratified according to ADT use); and (2) studies that involved interventions that combined exercise and diet, nutrition or other lifestyle.

Data extraction

4 Data were independently extracted by two reviewers (Shao WJ and Zhang HY) using a standardised data extraction sheet, and any disputes were discussed and settled by a third person (Zhang YM). Relevant data included study-related information (first author name, publication year, study location, participant characteristics, and details of the intervention), quality assessment information, sample size and outcomes data.

5 The outcomes of intra-group differences in the exercise and control groups were selected as priority data. Secondly, the outcomes at baseline and post-intervention were selected in the exercise and control groups, and then calculated the intra-group differences using formulas. The data were presented by mean and standard deviation. If the standard deviation was not originally reported, it was calculated based on related data (e.g., quartiles and 95% confidence intervals using the relevant formulas.

Quality assessment

6 The Cochrane risk of bias tool was used for the quality assessment, which assigns high, low, or unclear risks for selection bias, performance bias, detection bias, attrition bias, reporting bias, and other bias.

Data analysis

7 The statistical analyses were performed using RevMan software (version 5.3) and Stata software (version 12.0). Absolute net differences between the intervention and control groups were used to estimate merger effects. Outcomes were expressed as the weighted mean difference and its 95% CI. Random effect models were used given the heterogeneity of interventions.Subgroup analyses were performed according to exercise type, exercise intensity, exercise duration, and ADT duration.The Egger's and Begg's tests were used to judge publication bias. Differences were considered statistically significant at *P*-values of <0.05.