EVALUATING THE IMPACT OF RESISTANCE EXERCISE IN THE MANAGEMENT OF SARCOMA: A SCOPING REVIEW

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Background

Individuals treated for sarcomas often experience impairments to musculoskeletal structures. These impairments can contribute to reduced muscle function, altered body composition, and decreased mobility. Declines in musculoskeletal function offer a strong theoretical rationale for the investigation of resistance exercise in the management of sarcoma, though studies in this area are limited.

Purpose

The purpose of this scoping review was to assess the quantity and scope of available research investigating the use of resistance training in the management of individuals treated for sarcoma.

Methods

Eligibility Criteria:

- P: Patients diagnosed with sarcoma, no age restriction, and regardless of stage/type of sarcoma and treatment status (pre vs during vs post treatment)
- I: Resistance exercise lasting at least four weeks, and performed at least once a week
- C: Either non-exercise group or usual care
- O: Physical function assessments, physical strength, muscle mass, functional capacity, quality of life, or symptom management
- S: Randomized-controlled trials and single-arm trials published in peer-reviewed journal

Exclusion Criteria:

- Non-resistance exercise interventions including pilates, yoga, or other bodyweight exercises
- Mixed exercise interventions where resistance exercise was not the primary focus

Databases: MEDLINE, Embase, Cochrane Library, Scopus, and Web of Science

Search Date: September 1st, 2024 – December 1st, 2024

Keyword Examples: Bone, Soft-tissue, Oncology, Resistance Training, Physical Function

Methods Continued

Data Extraction: A standardized data extraction form was used to collect information from each included study, including study characteristics (authors, year of publication, study design), participants (sample size, demographics, sarcoma type and stage), intervention details (type, duration, frequency, intensity, and duration of the resistance exercise intervention), outcomes (primary and secondary outcomes related to physical function, muscle strength, muscle mass, functional capacity, quality of life, and change in symptoms), and results (findings to help determine effectiveness of the resistance exercise intervention). Data was synthesized descriptively. A summary was provided on the types of resistance exercises used, outcomes reported, and study characteristics.

Results

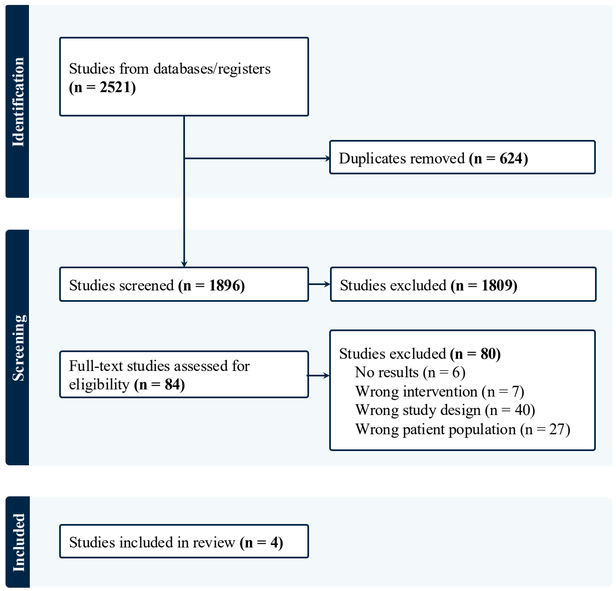

Figure 1: Flowchart of Article Selection Process for the Scoping Review

Results Continued

Four studies (3 randomized controlled trials and 1 case series) involving a total of 644 participants (study range 5 to 614) were included in this review. Each study assessed quality of life, and a variety of physical outcomes. The intervention length ranged from 8 to 24 weeks (frequency ranged from 1 to 5 days/week), and the ages of participants ranged from 8 to 41 years. Adherence was ≥85% in each of the included studies.

Table 2: Intervention Characteristics

Reference	Frequency	Intensity	Sets	Repetitions	Intervention duration	Intervention timing	Exercise selection
Du et al.	2x daily, 5 days per week	Based on MET scale. Stage I was 1.0-1.5 MET, Stage II was 1.5-2.5 MET, and stage III was 2.0-3.5 MET	Stage I: 3 sets per session. Stage II: 9 sets per session. Stage III: 10 sets per session.	20 repetitions per exercise. Timed exercises completed for 30 seconds	24 weeks	Second day post-operation	Range of motion and balance exercises targeting lower extremities, ankle plantar flexion/extension, knee extension, stair climb
Basteck et al.	2x per week	Not reported	Not reported	Not reported	8 weeks	At least one-year post surgery	Leg extension, leg flexion, hip abduction, hip adduction
Corr et al.	3x per week	50-70% of maximum heart rate during cardiovascular exercise. 6-20 Borg RPE scale used for RE intensity	3 sets per exercise. Number of exercises per session not reported.	10 repetitions per exercise	10-12 weeks	Before surgery	Bicep curl, tricep curl, press ups, shoulder flexion, leg bridge, leg extension, hamstring curls, calf raise, single leg squat
Smith et al.	3-5x per week for aerobic training, 2-3x per week for resistance training	40-70% of heart rate reserve for aerobic training. Intensity of RE prescribed and monitored according to staff exercise physiologist	1-2 sets of 8-10 resistance exercises per session.	12-15 repetitions per exercise	12 weeks	At least 10 years post-treatment	Not reported

Table 3: Study Outcome Results

Reference	Primary outcome results	Secondary outcome results
Du et al.	APE training resulted in significantly better results in functional knee recovery and quality of life than CPM training throughout the 5-year follow-up.	No significant difference between groups in rates of complications during follow-up period.
Basteck et al.	No statistical significance in gait function between the exercise intervention and control group, but small to medium effects found that demonstrated improvement in gait function with exercise intervention.	No statistical significance found in Quality of Life or Physical Function.
Corr et al.	Authors predicted 60% of patients would complete 50% of sessions, and trial found that 85.70% of patients were able to complete 50% of sessions.	Intervention group had significantly higher FMA than control group. No significant differences in range of motion or strength measurements.
Smith et al.	Participants lost body fat, peak oxygen consumption and ejection fraction increased, oxygen pulse improved. Maximal heart rate responses and respiratory exchange ratios remained stable.	None reported.

Conclusions

There is strong potential for the role of resistance exercise to counteract musculoskeletal impairments for individuals treated for sarcoma. Current evidence suggests potential benefits; however, the literature is highly heterogeneous with respect to:

- Study design and methodological rigor
- Sample size and patient demographics
- Exercise prescription components
- Outcome measures and timepoints used

These variations limit the ability to provide definitive information on the role of resistance exercise in the management of sarcoma.