High-intensity functional training improves physical function and body composition among cancer survivors

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INTRODUCTION

• There are currently over 14 million cancer survivors in the US [1].
• Exercise helps combat physical and psychological effects of cancer treatments [2].
• High-intensity functional training (HIFT) is a promising group-based exercise that emphasize functional movements
• HIFT utilizes multiple energy pathways by temporally combining aerobic and resistance training exercises, taking significantly less time than moderate intensity exercise [3].
• Potential HIFT benefits include metabolic and physiological adaptations, such as improvements in body composition and daily functioning.
• To date, HIFT has not been tested among cancer survivors.

PURPOSE

We investigated the feasibility and preliminary efficacy of a HIFT exercise program among adult cancer survivors within five years of their last cancer treatment.

METHODS

Design: Single-group pre-test, posttest pilot study
Participants (N=8):
• All participants were white and college educated,
• Age 53.5y (± 5.0), Range=47-60 years, 75% female
• Cancer stages ranged from I-IV, with breast (n=4), tongue (n=1), non-hodgkin lymphoma (n=1), skin squamous/basal cell (n=1), and unknown primary (n=1).
• Treatments included chemotherapy (n=6), radiation (n=3), and surgery/removal (n=3).

Measures:
• Feasibility
• Assessed by initiation, adherence, and acceptability
• Health-Related Quality of Life (HRQOL)
• European Organization for Research and Treatment of Cancer (EORTC) core 30-item questionnaire (QLQ-C30)
• Functional abilities: physical, role, cognitive, emotional and social functioning)
• Symptoms: fatigue, pain, and nausea/vomiting
• Global health status/quality of life

Body composition:
• Height (stadiometer) & Weight (digital scale)
• Waist and hip circumferences (flexible tape)
• Dual-energy X-ray absorptiometry scan

Table 1. Functional Movement Tests

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Domain Measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-Leg Stance Test</td>
<td>Balance</td>
</tr>
<tr>
<td>Sit and Reach</td>
<td>Flexibility</td>
</tr>
<tr>
<td>Prone Timed Up &amp; Go</td>
<td>Mobility, strength, balance and agility</td>
</tr>
<tr>
<td>Lift and Carry Test</td>
<td>Coordination, strength and agility</td>
</tr>
<tr>
<td>Chair Stand Test</td>
<td>Lower body strength and power</td>
</tr>
<tr>
<td>Repetitive Shelf</td>
<td>Upper body endurance and strength</td>
</tr>
<tr>
<td>Stair Climb</td>
<td>Power and balance</td>
</tr>
<tr>
<td>6 minute walk test</td>
<td>Cardiovascular endurance</td>
</tr>
</tbody>
</table>

Intervention
Duration: 5-weeks, 3 days/week for 60 minutes
• 4 testing sessions (functional movement tests)
• 12 group workouts with mobility and stretching exercises
  - Based on CrossFit™ training template
  - Led by CrossFit™ certified coaches
  - Constantly varied to include cardiovascular, body weight, and weight lifting exercises
  - Individually scaled

RESULTS

Feasibility: Recruitment rate: 80%; Adherence rate: 75%.

Enrollment: (n=30)
Allocated: (n=28)
Follow-Up: Did not complete (n=2)
Analysis: Analyzed (n=6)

Table 2. Changes in Functional Movement (n = 6)

Measure                  | Pre-Test M (SD) | Post-Test M (SD) | Percent Change | p-value
-------------------------|-----------------|------------------|----------------|--------
Single-Leg Stance Test   | 87.5 (59.5)     | 120.3 (62.1)     | +50.2          | 0.032  |
Sitting and Reaching     | 5.7 (2.3)       | 5.5 (2.4)        | +5.3           | 0.856  |
Lift and Carry Test      | 28.7 (17.2)     | 29.4 (18.6)      | +2.7           | 0.701  |
Chair Stand Test         | 8.9 (1.3)       | 7.8 (0.8)        | -10.9          | 0.071  |
Stair Climb Test         | 3.2 (1.5)       | 2.9 (1.2)        | -10.0          | 0.638  |
6-Minute Walk Test       | 368.3 (41.2)    | 373.8 (19.1)     | +15.6          | 0.039  |

HRQOL:
• Significant improvement in emotional functioning (6.9±6.3% p<0.05).
• Baseline: highest reported symptom was fatigue (M=18.5, SD=13.5)
• Posttest: fatigue and global health status remained consistent, non-significant increases in pain (11.1±13.6%), insomnia (11.1±17.2%), and constipation (5.6±13.6%)

Body Composition:
• BMI and waist-to-hip ratio did not significantly change.
• Participants significantly increased lean mass (+3.8±2.1kg (t=-3.42, p=0.008), and significantly decreased fat mass -3.3±1.0kg (t=-7.91, p<0.001) and body fat percentage by -4.7±1.2% (t=-9.39, p<0.001).

CONCLUSIONS

Five weeks of HIFT training was well-received, feasible, and effective for most cancer survivors, and, with movement screening can be offered as an option in exercise interventions.

Further work is needed to compare the efficacy of HIFT to moderate exercise among a larger sample.

REFERENCES