Effects of a Short Term, Short Duration, High Intensity Exercise Intervention on Body Composition and Intra-Abdominal Fat

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EFFECTS OF A SHORT TERM, SHORT DURATION, HIGH INTENSITY EXERCISE INTERVENTION ON BODY COMPOSITION AND INTRA-ABDOMINAL FAT

RESEARCHERS
GAVIN MCBRIDE, KALENE LYNCH, RICKY LANG, DUSTIN STANEK, DANIEL MARKIN
PRESENTATION OVERVIEW

• INTRODUCTION
• METHODOLOGY
• RESULTS
• DISCUSSION
**INTRODUCTION:**

- **What is High Intensity Interval Training (HIIT)?** (Shiraev & Barclay, 2012)
  - Repeatedly exercising at a high intensity (above 80% VO2max)
  - 30 seconds – several minutes
  - Resting 1-5 minutes between bouts

- **What is Tabata?** (Eberts, Porcari, Doberstein, Steffen, & Foster, 2013)
  - A form of HIIT, performed at maximal effort
  - 20 seconds of work followed by 10 seconds of rest
  - Repeated for a total of 8 rounds
INTRODUCTION: KNOWN BENEFITS

• **High Intensity Interval Training (Boutcher, 2011)**
  • Improvement in body composition
    • Subcutaneous and visceral fat, body mass, waist to hip ratio
  • Increase in VO2 max
  • Improves cognitive function (Driggy et al., 2012)

• **Tabata**
  • Recent research shows 13.5 Cal burned per minute & doubled metabolic rates for 30 minutes post workout (Rossi, 2013)
    • A 4 min Tabata Jump Squat protocol
INTRODUCTION: DISEASE PREVENTION

HIGH INTENSITY INTERVAL TRAINING CAN IMPROVE:

• METABOLIC SYNDROME: A GROUP OF RISK FACTORS THAT RAISE YOUR RISK FOR CARDIOVASCULAR DISEASE, STROKE, DIABETES.
  • ONE OF THE RISKS IS ABDOMINAL OBESITY, EXCESS INTRA-ABDOMINAL FAT STORES (IAF).

• CARDIOVASCULAR DISEASE PREVENTION: 30 MINUTES, 5 DAYS PER WEEK OF MODERATE AEROBIC EXERCISE IS RECOMMENDED FOR CARDIOVASCULAR HEALTH (ACSM, 2010)

DO WE HAVE THE TIME?
HYPOTHESIS

• **Short term (10 sessions), short duration HIIT (8-rounds Tabata) will significantly improve body composition (Body mass, Body Fat %) and the amount of intra-abdominal fat.**
METHODS: EQUIPMENT

• **The Bod Pod** was used to assess body composition (Body mass (BM), Body Fat % (BFP))

• **Ultrasound (US)**, by BodyMetrix, was used to assess intra-abdominal fat depth (IAF)
  - Ultrasound is comparable to MRI & CT scans for assessing fat depth
  - Starting 2 cm to the right of the umbilicus, scanned horizontally 4 cm to the right
METHODS: EQUIPMENT

BodyMetrix Ultrasound Device

Ultrasound Abdominal Measurement
METHODS: PROTOCOL

• A repeated jump squat protocol was selected for the Tabata exercise
  • Sands, et al. protocol for a Bosco Test was used as guideline for jump squats (2004)

• Participants completed 10 sessions, every other day, over a 3-week period

• A 5-min warm up run at a moderate pace was performed prior to each session along with 5 lower body dynamic stretching movements.

• Pre-testing was done two days prior to first session

• Post-test was completed within two days of last session
## RESULTS

Table 1.

Analysis of Body Composition and IAF After Body-Weight Tabata Intervention

<table>
<thead>
<tr>
<th></th>
<th>Pre Test</th>
<th>Post Test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>BFP (%)</td>
<td>20.23</td>
<td>5.39</td>
<td>20.78</td>
</tr>
<tr>
<td>BM (kg)</td>
<td>67.08</td>
<td>16.21</td>
<td>67.27</td>
</tr>
<tr>
<td>US</td>
<td>17.55</td>
<td>5.52</td>
<td>16.82</td>
</tr>
</tbody>
</table>

**p < .05, M=Mean, SD=Standard Deviation**
DISCUSSION

- Studies have shown HIIT to be successful in improving body composition and IAF fat depth (Boutcher, 2011).
- Few studies have been done with such a short duration (10 total sessions).
- While significance was found in IAF, no significance was seen in either BM or BFP.
- Possibly attributable to error in technique with US.
<table>
<thead>
<tr>
<th>Study</th>
<th>Subcutaneous fat (kg)</th>
<th>Abdominal/trunk fat (kg)</th>
<th>Body mass (kg)</th>
<th>Waist circumference (cm)</th>
<th>Type of HIIE</th>
<th>Length of intervention</th>
<th>VO₂max ml kg⁻¹ min⁻¹</th>
<th>Insulin sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bondon et al. [38]</td>
<td>≈ 18%</td>
<td>≈ 44%</td>
<td>≈ 1.9 kg (2%)</td>
<td>—</td>
<td>SSE + 5 x 2/3 R</td>
<td>8 weeks</td>
<td>—</td>
<td>≈ 58%</td>
</tr>
<tr>
<td>Buxomaster et al. [37]</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>4-6</td>
<td>6 weeks</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Dunn [46]</td>
<td>≈ 2.6 kg (8%)</td>
<td>≈ 1.2 kg (3%)</td>
<td>≈ 1.9 kg (3%)</td>
<td>≈ 3.5 cm (4%)</td>
<td>60 x 8 s/12 s</td>
<td>12 weeks</td>
<td>≈ 18%</td>
<td>≈ 74%</td>
</tr>
<tr>
<td>Helgerud et al. [39]</td>
<td>—</td>
<td>—</td>
<td>≈ 8 kg (1%)</td>
<td>—</td>
<td>15 s/15 s</td>
<td>8 weeks</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Helgerud et al. [39]</td>
<td>—</td>
<td>—</td>
<td>≈ 1.5 kg (2%)</td>
<td>—</td>
<td>4 x 4 min/4 min</td>
<td>8 weeks</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Mourier et al. [40]</td>
<td>≈ 18%</td>
<td>≈ 48%</td>
<td>≈ 1.5 kg (2%)</td>
<td>≈ 1.0 cm (1%)</td>
<td>SSE + 5 x 2/3 R</td>
<td>8 weeks</td>
<td>—</td>
<td>≈ 41%</td>
</tr>
<tr>
<td>Perry et al. [41]</td>
<td>—</td>
<td>—</td>
<td>≈ 2.2 kg (.03%)</td>
<td>—</td>
<td>10 x 4 min/2 min</td>
<td>2 weeks</td>
<td>—</td>
<td>≈ 9%</td>
</tr>
<tr>
<td>Talanian et al. [42]</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>10 x 4 min/2 min</td>
<td>2 weeks</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Tjonna et al. [43]</td>
<td>—</td>
<td>—</td>
<td>≈ 2.1 kg (2.5%)</td>
<td>≈ 5.0 cm (5%)</td>
<td>4 x 4 min/3 min</td>
<td>16 weeks</td>
<td>—</td>
<td>≈ 26%</td>
</tr>
<tr>
<td>Tjonna et al. [3]</td>
<td>≈ 2.4 kg (7%)</td>
<td>≈ 1.5 kg (8%)</td>
<td>≈ 1.1 kg (.3%)</td>
<td>≈ 7.2 cm (7%)</td>
<td>4 x 4 min/3 min</td>
<td>12 weeks</td>
<td>—</td>
<td>≈ 29%</td>
</tr>
<tr>
<td>Trapp et al. [5]</td>
<td>≈ 2.5 kg (10%)</td>
<td>≈ 1.5 kg (10%)</td>
<td>≈ 1.51 kg (26%)</td>
<td>—</td>
<td>60 x 8 s/12 s</td>
<td>15 weeks</td>
<td>—</td>
<td>≈ 24%</td>
</tr>
<tr>
<td>Tremblay et al. [38]</td>
<td>≈ 15%</td>
<td>≈ 15%</td>
<td>—</td>
<td>—</td>
<td>15 x 30 s</td>
<td>24 weeks</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Warburton et al. [44]</td>
<td>—</td>
<td>—</td>
<td>≈ 3.0 kg (4%)</td>
<td>—</td>
<td>7 x 2 min/2 min</td>
<td>16 weeks</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Whyte et al. [45]</td>
<td>—</td>
<td>—</td>
<td>≈ 1.0 kg (2%)</td>
<td>≈ 2.4 cm (2%)</td>
<td>4-6</td>
<td>2 weeks</td>
<td>—</td>
<td>≈ 9%</td>
</tr>
</tbody>
</table>
DISCUSSION

• LIMITATIONS
  • Technique and experience with US device and software
  • Lack of maximal effort by participants

• FUTURE RESEARCH
  • Use of heart rate monitors
  • Control for outside activity and exercise
  • 10 sessions done on back to back days
  • Different full body, body-weight exercises
  • Sedentary versus active population
REFERENCES


REFERENCES


BodyMetrix System vs. Skinfold Caliper Validation Studies.
THANK YOU

A SPECIAL THANKS TO DR. REPOVICH FOR ANSWERING ENDLESS QUESTIONS AND ALWAYS OFFERING GUIDANCE!

QUESTIONS?