Effect of a medium-term exercise intervention on fat mass is partially compensated for by increased appetite, but not reduced non-exercise physical activity

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Effect of a medium-term exercise intervention on fat mass is partially compensated for by increased appetite, but not reduced non-exercise physical activity

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Background

• Exercise-induced weight loss is often less than expected and highly variable between individuals (1-2).

• This implies some degree of compensation in response to the exercise-induced energy deficit (3-4).

• Given that energy intake (EI), non-exercise physical activity (NEPA) and sedentary behaviour (SB) are major determinants of body mass, compensation in these components could undermine the exercise-induced energy deficit and attenuate weight loss.

Aim

• The aim of this study was to examine changes in body composition, appetite, NEPA and SB in response to a 12-week supervised and monitored aerobic exercise intervention in overweight and obese women.

Table 1. Anthropometrics, body composition and RMR at baseline and post-intervention (n = 24). Data are mean (SD).

<table>
<thead>
<tr>
<th>Measure</th>
<th>Baseline</th>
<th>Post-intervention</th>
<th>Change</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body mass (kg)</td>
<td>76.50 (10.40)</td>
<td>75.68 (10.23)</td>
<td>-0.83 (1.85)</td>
<td>.040</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>27.94 (2.67)</td>
<td>27.63 (2.70)</td>
<td>-0.30 (0.66)</td>
<td>.035</td>
</tr>
<tr>
<td>WC (cm)</td>
<td>95.21 (9.89)</td>
<td>91.60 (9.03)</td>
<td>-3.62 (3.85)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>FM (kg)</td>
<td>30.78 (7.97)</td>
<td>28.78 (7.96)</td>
<td>-1.50 (2.18)</td>
<td>.003</td>
</tr>
<tr>
<td>FFM (kg)</td>
<td>46.23 (4.16)</td>
<td>46.90 (3.89)</td>
<td>0.67 (0.98)</td>
<td>.003</td>
</tr>
<tr>
<td>RMR (kcal/d)</td>
<td>1616.09 (201.98)</td>
<td>1668.85 (205.12)</td>
<td>52.76 (154.51)</td>
<td>.108</td>
</tr>
</tbody>
</table>

• There was no evidence for a compensatory reduction in NEPA or an increase in SB.

• Exercise increased hunger and EI which only partially compensated for exercise-induced weight loss. Int J Obes 2008, 32:177-184.

• There was a small significant reduction in body mass (p = .04), BMI (p = .035), WC (p < .001), fat mass (p = .003) and a significant increase in fat-free mass (p = .003).

• There was no significant change in RMR from baseline to post-intervention (p = .304), see table 1.

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Methods

• Twenty-four women aged 33.1 years (SD = 11.7) with a body mass index (BMI) of 27.9 kg/m² (SD = 2.7) completed twelve weeks of supervised exercise (500 kcal, 5 times per week). See figure 2 for overview of study procedures.

• Body mass, waist circumference (WC), body composition, resting metabolic rate (RMR), total daily EI and subjective appetite sensations were measured at baseline (week 0) and post-intervention (week 13).

• Free-living physical activity (PA) and SB were measured at baseline, week 1 and 10 of the exercise intervention, and post-intervention (week 13) using the SenseWear Armband Mini (SWA; see figure 1).

Results

• There was a small significant reduction in body mass (p = .04), BMI (p = .035), WC (p < .001), fat mass (p = .003) and a significant increase in fat-free mass (p = .003).

• There was no evidence for a compensatory reduction in NEPA or an increase in SB. See figure 2 for overview of study procedures.

• Overall, exercise increased hunger and EI which only partially compensated for the increase in energy expenditure (EE).

• There was no evidence for a compensatory reduction in NEPA or an increase in SB. The structured exercise displaced some SB.

Conclusions

• Twelve weeks of supervised aerobic exercise resulted in a small but significant reduction in FM and an increase in FFM. There was considerable individual variability.

• There was no compensatory reduction in NEPA (p = .99; figure 4), and no increase in SB as a result of increased structured exercise (p=.03).

• The structured exercise displaced some SB.

References


Figure 1. SenseWear Armband Mini specifications and positioning.

Figure 2. Overview of the medium-term exercise study procedures; FL-PA, free-living physical activity.

Figure 3. Visual analogue scale (VAS) hunger (A) and fullness (B) ratings during baseline and post-intervention probe days (error bars are standard error) * = p < .05 indicates significant difference between baseline and post-intervention.

Figure 4. Change in NDR before, during and after the exercise intervention.

Acknowledgements

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