p<0.05 were considered significant. Stepwise linear regression analysis was used to ascertain the independent predictive value and impact of each parameter proved to significantly correlate.

Comparison between baseline, post-exercise and recovery hormonal values was performed with repeated-measures one-way analysis of variance (ANOVA) for normally distributed variables and with the Friedman test for non-normally distributed variables. Bonferroni adjustment for multiple comparisons was applied. Comparison between baseline and post-exercise features regarding body composition was performed using the paired-samples t-test. Two-tailed statistical significance was set at 5%.

RESULTS

Changes in anthropometric values

The anthropometric features were assessed at baseline for all 17 participants and at the end of the race for 6 of them (Table 1). The comparison showed a significant reduction in BMI, body weight and body fat mass (p<0.001, p<0.001 and p<0.05, respectively) and a marginal, but not significant, reduction in body fat percentage (p=0.082).

Changes in hormonal values
(comparison among baseline, post-exercise and recovery values)

At the end of the 180 km race resistin levels were significantly higher compared to baseline values (Table 3, p<0.001). At the recovery phase resistin levels were reduced compared to post-exercise levels (Table 3, p<0.05), but remained significantly higher compared to baseline values (Table 3, p<0.05).

Furthermore, at the end of the 180 km race leptin levels were significantly lower compared to baseline values (Table 3, p<0.001). If leptin values are expressed as the ratio per kilogram (kg) of body fat (leptin/kg of body fat), a significant reduction at the end of the race is documented as well (p<0.001). At the recovery phase serum leptin levels were higher compared to post-exercise levels (Table 3, p<0.001), but remained significantly lower compared to baseline values (Table 3, p<0.001).

No differences were documented between baseline and post-exercise serum adiponectin and visfatin levels (Table 3). At the recovery phase, although adiponectin levels were lower compared to the post-exercise values (Table 3, p<0.05), no difference was documented in comparison to the baseline values.

In addition, post-exercise cortisol levels were significantly higher compared to baseline values (Table 3, p<0.001). At the recovery phase serum cortisol levels were lower compared to post-exercise levels (Table 3, p<0.001) and returned to baseline levels (Table 3).

Finally, post-exercise insulin levels were significantly reduced compared to baseline values (Table 3, p<0.05). At the recovery phase, insulin levels were higher compared to post-exercise levels (Table 3, p<0.05) and returned to baseline levels (Table 3).

Correlations

Correlations between anthropometric features and hormonal values at baseline

Baseline leptin levels were positively correlated with BMI (r=0.519, p=0.029) and body fat mass (r=0.534, p=0.027), while a marginal but not significant positive correlation was documented between serum leptin levels and body fat percentage (r=0.447, p=0.072).

Table 3. Hormonal features of participants at baseline, post-exercise and at recovery*

<table>
<thead>
<tr>
<th></th>
<th>Baseline (n=17)</th>
<th>Post-exercise (n=17)</th>
<th>Recovery (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistin (ng/ml)</td>
<td>7</td>
<td>77.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>16.1&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Leptin (ng/ml)</td>
<td>1.6</td>
<td>0.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.7&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Adiponectin (μg/ml)</td>
<td>8.1</td>
<td>8.2</td>
<td>7.8&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Visfatin (ng/ml)</td>
<td>30.9</td>
<td>32.8</td>
<td>35.9</td>
</tr>
<tr>
<td>Cortisol (μg/dl)</td>
<td>17.6</td>
<td>39.77&lt;sup&gt;a&lt;/sup&gt;</td>
<td>19.20&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Insulin (μIU/ml)</td>
<td>5.1</td>
<td>2.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.5&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

*Hormonal values are expressed as median and interquartile range (25<sup>th</sup>-75<sup>th</sup>).  
<sup>a</sup>: p<0.05 vs. baseline value, <sup>b</sup>: p<0.05 vs. post-exercise value

Bonferroni adjustment for multiple comparisons was applied.