Study for Influence which humidity and temperature (Atmospheric pressure) have on heart rate:
Focus of proper temperature at the time of the training

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Abstract
The purpose of this study was to investigate factors of heart rate at running. First, three male high school runner tried warming up in 5 minutes, out of lavatory. Second, they tried running with different speed (6km/h, 9km/h, and 11km/h) on the treadmill in 30 minutes. Subject A and B was middle long distance runner and C was sprint runner. Digital thermometer and hygroscope were set on the treadmill. GPS watch and heart rate meter were used to measure heart rate. The main result of this study were 1) A temperature area of 18 degrees was the highest heart rate in all temperature area of the all subjects. 2) Subject A and C showed sudden heart recovery. But subject B showed relatively slow heart rate recovery. 3) Subject A and B showed that their heart rate rose with a speed change. These results indicated that at around 18 degrees their heart rate can be raised quickly. Even if temperature rises, internal temperature does not rise. As for the extreme temperature, a heart rate becomes hard to rise. And middle long-distance runner can raise a heart rate at the time, they change the speed. On the other hand sprint runner can raise a heart rate without the change of speed progressively.

I. Preface

Recent studies in sports science says that running can not only improve one’s fundamental physical fitness, but have a good effect for a contestant by running with a way of training using one’s heart rate data.

Among the many athletic event, I paid attention to the change of a heart rate of both a long-distance runner and sprinter. I decide that I had them run changing their speed under an equivalence condition. So I examined what kind of concrete characteristic appeared for each result.

I aim at improving the better way of warming up on carrying out a different kind competition, and developing the rehabilitation program for contestant, elderly person, and the disabled

II. Experiment procedure

I have three subjects (two are long-distance runners, the other is sprit runner, all the three are 16 years old) run on the treadmill in our gymnasium practice room for 35 minutes, and performed a heart rate measurement.

The speed of running are increased every ten minutes gradually with 6km/h,9km/h,11km/h

For the purpose of estimating “proper temperature”, I set a temperature in the room at 18℃, 21℃, 28.5℃

The humidity assumed it a fixed condition

III. Result

As a result of result A(long-distance runner) (figure 4)

As a result of result B (long-distance runner) (figure 5)

As a result of 3 result C (sprinter) (figure 6)

IV. Summary

<table>
<thead>
<tr>
<th>Long distance runner</th>
<th>Item</th>
<th>Sprit runner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Around 18℃ Celsius</td>
<td>proper temper</td>
<td>Around 18℃ Celsius</td>
</tr>
<tr>
<td>He keep a constant heartbeat without being influenced by a speed change to a certain heart rate (It continue rising until a heartbeat is stable)</td>
<td>Characteristic of the heartbeat</td>
<td>A heart rate is raised progressively</td>
</tr>
<tr>
<td>There is no meaningful difference</td>
<td>Heartbeat recovery</td>
<td>There is no meaningful difference</td>
</tr>
<tr>
<td>There is the meaningful difference (personal level)</td>
<td>Time required for an upswing in heartbeat</td>
<td>There is the meaningful difference (personal level)</td>
</tr>
<tr>
<td>There is the meaningful difference (personal level)</td>
<td>The best heart rate</td>
<td>There is the meaningful difference (personal level)</td>
</tr>
</tbody>
</table>

In the temperature zone less than 18℃Celsius measure, and decide width of the proper temperature in detail

Carry out the blood lactic acid level measurement in an outside research facility; a study (Japanese tennis society, other meetings for the study) about the warm-up according to the study on training contents of the subject and enforcement (SSH) and the competition of the advice