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 payed attention to the change of a hear t 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**

measuring instrument

「Foreatlete610」

「Heartbeat meter」

Analysis soft

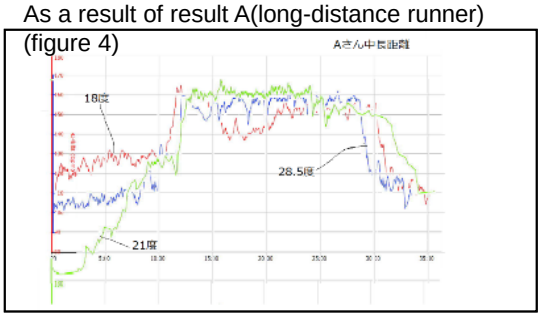
Figure 1 treadmill (product made in Sakai medical care device company)

Figure 2 protection from the wind (product made in corrugated cardboard)

Figure 3 digital hygrometer(product made in company)

Ⅲ. Result

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



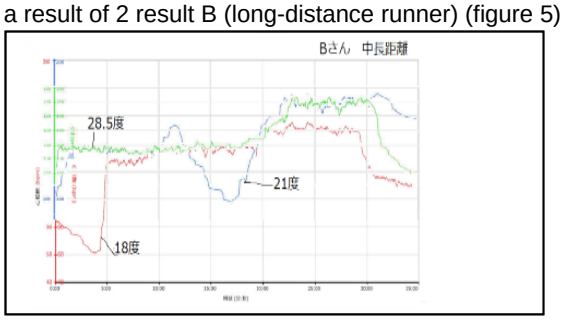
Heartbeat result of a measurement of all subjects

A	天気	温度	湿度	スタート	１０分後	２０分後	３０分後	３５分後
8月30日	晴れ	21	62.5	73	124	160	151	110
9月16日	晴れ	28.5	56.8	98	111	158	158	105
11月15日	晴れ	18	38.8	84	136	147	123	109

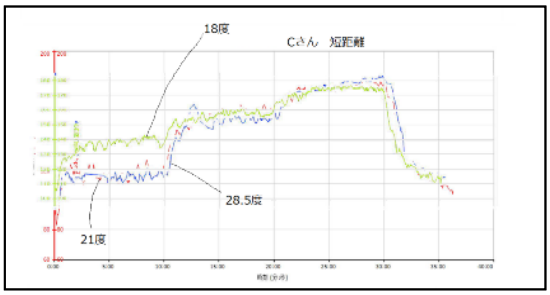
B	天気	温度	湿度	スタート	１０分後	２０分後	３０分後	３５分後
8月30日	晴れ	21	62.5	73	124	160	151	110
9月16日	晴れ	28.5	56.8	120	138	143	172	120
11月15日	晴れ	18	38.8	91	128	147	137	108

C	天気	温度	湿度	スタート	１０分後	２０分後	３０分後	３５分後
8月30日	晴れ	21	62.5	90	120	164	167	112
9月16日	晴れ	28.5	56.8	92	117	159	181	115
11月15日	晴れ	18	38.8	108	138	161	171	113

As a result of 2 result B (long-distance runner) (figure 5)



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



Ⅳ. Summary

Long distance runner	Item	Sprit runner
Around 18℃ Celsius	proper temper	Around 18℃ Celsius
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)	Characteristic of the heartbeat	A heart rate is raised progressively
There is no meaningful difference	Heartbeat recovery	There is no meaningful difference
There is the meaningful difference (personal level)	Time required for an upswing in heartbeat	There is the meaningful difference (personal level)
There is the meaningful difference (personal level)	The best heart rate	There is the meaningful difference (personal level)

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